

PROPOSED  
FISCAL YEAR 2016-17 FUNDING PLAN  
FOR  
LOW CARBON TRANSPORTATION AND FUELS INVESTMENTS  
AND  
THE AIR QUALITY IMPROVEMENT PROGRAM



Release Date: May 20, 2016

Board Consideration: June 23-24, 2016

This page intentionally left blank.

## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>i</b>
<b>PART I: PROPOSED INVESTMENTS.....</b>	<b>1</b>
<b>CHAPTER 1: INTRODUCTION AND BACKGROUND .....</b>	<b>1</b>
<b>CHAPTER 2: PROPOSED FUNDING ALLOCATIONS FOR FY 2016-17 .....</b>	<b>10</b>
<b>CHAPTER 3: LIGHT-DUTY VEHICLE INVESTMENTS (SB 1275) .....</b>	<b>14</b>
Policy and Statutory Drivers .....	14
CVRP .....	16
Light-Duty Pilot Projects to Benefit Disadvantaged Communities .....	26
EFMP Plus-up .....	29
Car Sharing and Mobility Options .....	33
Increased Public Fleet Incentives for CVRP-Eligible Vehicles.....	36
Agricultural Worker Vanpools in the San Joaquin Valley .....	38
Financing Assistance for Lower-Income Consumers .....	40
<b>CHAPTER 4: HEAVY-DUTY VEHICLE AND OFF-ROAD EQUIPMENT INVESTMENTS (SB 1204 and AQIP) .....</b>	<b>44</b>
Policy and Statutory Drivers .....	44
Advanced Technology Demonstration Projects.....	47
Zero-Emission Freight Equipment Pilot Commercial Deployment Project.....	53
Zero-Emission Truck Pilot Commercial Deployment Project .....	55
Zero-Emission Bus Pilot Commercial Deployment Project.....	57
Rural School Bus Pilot Project .....	59
Low NOx Engine Incentives .....	61
HVIP .....	63
Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley.....	70
Truck Loan Assistance Program .....	72
<b>CHAPTER 5: VERY LOW CARBON FUELS INVESTMENTS .....</b>	<b>77</b>
Policy and Statutory Drivers .....	77
Very Low Carbon Fuels Incentives.....	80
<b>CHAPTER 6: MAXIMIZING DISADVANTAGED COMMUNITY BENEFITS FOR LOW CARBON TRANSPORTATION AND FUELS INVESTMENTS .....</b>	<b>84</b>
<b>CHAPTER 7: CONTINGENCY PROVISIONS .....</b>	<b>90</b>

<b>PART II: LONG-TERM PLAN FOR CVRP AND LIGHT-DUTY VEHICLE INCENTIVES.....</b>	<b>93</b>
<b>Overview .....</b>	<b>94</b>
<b>Statutory Goals and Requirements .....</b>	<b>94</b>
<b>Three-Year Forecast of Funding Needs .....</b>	<b>95</b>
<b>Market and Technology Assessment .....</b>	<b>103</b>
<b>A Sustainable ZEV Market .....</b>	<b>116</b>
<b>Long-Term Plan Conclusions .....</b>	<b>128</b>

## **APPENDICES**

<b>Appendix A: Emission Reductions Quantification Methodology</b>	
<b>Appendix B: SB 1204 Requirements and Performance Criteria Evaluation for Heavy-Duty Projects</b>	
<b>Appendix C: CVRP – Terms and Conditions and Implementation Manual</b>	
<b>Appendix D: Public Fleet Pilot Project – Terms and Conditions and Implementation Manual</b>	
<b>Appendix E: HVIP – Implementation Manual</b>	

## EXECUTIVE SUMMARY

---

The Governor's proposed Fiscal Year (FY) 2016-17 State Budget includes \$500 million for Low Carbon Transportation and Fuels investments administered by the Air Resources Board (ARB or Board) from Cap-and-Trade auction proceeds deposited into the Greenhouse Gas Reduction Fund (GGRF). This funding would reduce greenhouse gas (GHG) emissions and further the purposes of Assembly Bill 32 (AB 32) (Núñez, Chapter 488, Statutes of 2006) with a priority on benefiting disadvantaged communities. At least half these funds would be invested to benefit disadvantaged communities, and at least 10 percent would be invested directly in disadvantaged communities. This proposal includes \$40 million to support the production of very low carbon fuels, a new addition to ARB's incentive programs. The Governor's proposed State Budget includes \$28.6 million for the Air Quality Improvement Program (AQIP) which provides mobile source incentives to reduce emissions of criteria pollutants, toxic air contaminants, and GHGs.

The proposed *Fiscal Year 2016-17 Funding Plan for Low Carbon Transportation and Fuels Investments and AQIP* (FY 2016-17 Funding Plan) describes how these combined funds will be spent. The plan describes ARB's policy drivers and vision for advanced technology mobile source investments, eligible project categories and criteria, project funding allocations, and program implementation details. ARB staff has developed a joint plan for both the auction proceeds and AQIP funding sources, as it did for previous budget cycles, to ensure continued synergistic investments between the programs while also ensuring that statutory requirements applicable to each are met. The investments proposed in the FY 2016-17 Funding Plan are contingent on the approval of the proposed FY 2016-17 State Budget.

California faces ambitious goals to reduce GHG emissions, improve air quality, deploy zero-emission vehicles (ZEVs), and reduce petroleum dependency. ARB's 2014 *First Update to the Climate Change Scoping Plan* and 2016 *Mobile Source Strategy* conclude that many of the same actions are needed to meet GHG, smog forming, and toxic pollutant emission reduction goals – specifically, a transition to zero-emission and near zero-emission technologies and use of the cleanest, lowest carbon fuels and energy across all vehicle and equipment categories. The *California Sustainable Freight Action Plan*, May 2016 draft, reiterates the need for this transition as it relates to the freight sector. To support this transition, the Administration's first two Cap-and-Trade Auction Proceeds Investment Plans both identify zero-emission passenger transportation and low carbon freight transport as investment priorities.

The investments identified in the proposed FY 2016-17 Funding Plan are pivotal to meeting these goals by accelerating the development and deployment of advanced mobile source technologies and very low carbon fuels. These proposed investments build on previous ARB Low Carbon Transportation and AQIP investments and continue the focus on providing benefits to disadvantaged communities.

## Background

Cap-and-Trade auction proceeds provide funding for ARB's advanced technology, clean transportation incentive programs, expanding the types of projects ARB has funded through AQIP. Over the last 3 budget cycles, the Legislature has appropriated \$325 million to ARB for Low Carbon Transportation investments to reduce GHG emissions with an emphasis on investments that benefit disadvantaged communities. These investments are being used to provide consumer rebates for zero-emission and plug-in hybrid passenger vehicles through the Clean Vehicle Rebate Project (CVRP) and vouchers for fleets to purchase clean trucks and buses through the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP). Investments also include new light-duty pilot projects to benefit disadvantaged communities, zero-emission truck and bus pilot deployment projects, and advanced technology demonstration projects for the freight sector.

AQIP is a mobile source incentive program focusing on reducing criteria pollutant and diesel particulate emissions with concurrent reductions in GHG emissions. AQIP was created in 2007 by AB 118 (Núñez, Chapter 750, Statutes of 2007) and reauthorized by AB 8 (Perea, Chapter 401, Statutes of 2013). AQIP has provided funding for CVRP, HVIP, and demonstrations for advanced emission reduction vehicle technologies since 2009. In recent years, these projects have been primarily funded from the Low Carbon Transportation appropriations because demand has exceeded AQIP's budget, and the majority of AQIP funds have been directed to the Truck Loan Assistance Program which helps small business truckers to secure financing for newer trucks and diesel exhaust retrofits to meet compliance deadlines for ARB's In-Use Truck and Bus Regulation.

## Summary of Staff's Investment Proposal

Staff's investment proposal builds upon the investments made in previous funding cycles. In FY 2015-16, ARB implemented a scaled back version of its Funding Plan because the Legislature only appropriated \$95 million for Low Carbon Transportation investments compared to the \$350 million that the Governor had proposed. As a result, many of the projects the Board endorsed when it approved the FY 2015-16 Funding Plan could not be implemented. Light-duty equity projects and heavy-duty vehicle projects bore the brunt of this downsizing. Staff still believes there is a strong need and demand for these unfunded projects, so it made carrying forward these project categories a priority for the FY 2016-17 Funding Plan. This will help regain critical momentum in supporting the transition of the heavy-duty fleet as called for in the draft *California Sustainable Freight Action Plan* and increasing disadvantaged communities' and lower-income Californians' access to clean transportation. Stakeholders noted throughout the FY 2016-17 Funding Plan development process a need for incentive funding beyond that in the proposed State Budget. Staff's proposal attempts to balance available funding with the funding needs across all categories.

Tables ES-1 and ES-2 show the proposed project allocations for the Low Carbon Transportation and Fuels program and AQIP, respectively. These investments would:

- Meet expected demand for consumer driven, first-come, first-served projects including: CVRP consumer rebates for ZEVs; Enhanced Fleet Modernization Program (EFMP) car scrap and replace incentives; HVIP clean truck and bus vouchers; the Truck Loan Assistance Program; and new incentives for low NOx engines just coming to market. The proposal includes funding to meet the remaining CVRP and HVIP consumer demand from the FY 2015-16 cycle.
- Increase funding for the light-duty vehicle projects designed to improve access to clean transportation for lower income Californians and disadvantaged communities, a key element of ARB's light-duty vehicle incentive strategy.
- Carry forward the unfunded heavy-duty vehicle and equipment project categories from the FY 2015-16 Funding Plan, refining them where necessary based on information learned over the past year. These include: advanced technology demonstration projects; zero-emission truck and bus commercial pilots; freight equipment deployment; and a new rural school bus pilot project.
- Provide funding for a new very low carbon fuel production incentive project. This is the first time fuels are included in ARB's Low Carbon Transportation program.

**Table ES-1: Proposed Low Carbon Transportation and Fuels Project Allocations**

<b>Low Carbon Transportation and Fuels Project Category</b>	<b>Project Allocation (millions)</b>
<b>Light-Duty Vehicles Investments (SB 1275)</b>	
CVRP Remaining 2015-16 Demand (Through Sept 2016) - \$55M 2016-17 Demand (Oct 2016-Sept 2017) - \$175M	\$230
Light-Duty Pilot Projects to Benefit Disadvantaged Communities Enhanced Fleet Modernization Program (EFMP) Plus-Up - \$30M Car Sharing and Mobility Options - \$8M Increased Public Fleet Incentives for CVRP-Eligible Vehicles - \$3M Agricultural Worker Vanpools in San Joaquin Valley - \$3M	\$44
Financing Assistance for Lower-Income Consumers	\$6
<b>Light-Duty Vehicle Investment Total</b>	<b>\$280</b>
<b>Heavy-Duty Vehicles and Off-Road Equipment Investments (SB 1204)</b>	
Advanced Technology Demonstration Projects	\$59
Zero-Emission Freight Equipment Pilot Commercial Deployment Project	\$5
Zero-Emission Truck Pilot Commercial Deployment Project	\$18
Zero-Emission Bus Pilot Commercial Deployment Project	\$42
Rural School Bus Pilot Project	\$10
Low NOx Engine Incentives with Renewable Fuel	\$23
HVIP Remaining 2015-16 Demand (Through Sept 2016) - \$5M 2016-17 Demand (Oct 2016-Sept 2017) - \$13M	\$18
<b>Heavy-Duty Vehicle and Off-Road Equipment Investment Total</b>	<b>\$175</b>
<b>Fuels</b>	
Very Low Carbon Fuels Production Incentive Project	\$40
<b>State Operations</b>	<b>\$5</b>
<b>TOTAL</b>	<b>\$500</b>

**Table ES-2: Proposed AQIP Project Allocations**

<b>AQIP Project Category</b>	<b>Project Allocation (millions)</b>
Truck Loan Assistance Program	\$22
Agricultural Equipment Trade-Up Pilot in the San Joaquin Valley	\$3
Reserve for Revenue Uncertainty	\$3.6
<b>TOTAL</b>	<b>\$28.6</b>

ARB is targeting at least 50 percent of the Low Carbon Transportation and Fuels funds to benefit disadvantaged communities and at least 10 percent of these funds to be invested in disadvantaged communities. Staff considers these investment targets to be a floor. Investments made over the past three funding cycles are delivering benefits that exceed these targets, and ARB staff is confident that it will again surpass the minimum targets with the FY 2016-17 investments.

In order to meet these investment targets, staff proposes to limit some funding opportunities exclusively to those projects that are located in or benefit disadvantaged communities. In other cases, staff proposes placing conditions in the solicitations and/or grant agreements to ensure a minimum percentage of funding for a project category will benefit disadvantaged communities. In the case of the statewide, first-come, first-served projects, staff used historical data to estimate potential disadvantaged community benefits. Details are described further in Chapter 2 of this Funding Plan and in each project category proposal in Chapters 3, 4, and 5.

#### Long-Term Plan for CVRP and Light-Duty Vehicle Incentives

In addition to the proposed investments for the FY 2016-17 funding cycle, the second part of the Funding Plan presents staff's long-term plan for CVRP and light-duty vehicle incentives. ARB has directed significant funding (over \$300 million to date) toward light-duty vehicle incentives, primarily through CVRP. Because of this, policy makers continue to inquire about the cost-effectiveness, equity, financial sustainability, and structure of these incentive programs. Specifically, the Legislature and the Board have expressed interest in understanding when a self-sustaining ZEV market is expected and what steps can be taken to ensure incentives are phased out appropriately.

Senate Bill 1275 (SB 1275) (De León, Chapter 530, Statutes of 2014), one of the laws guiding ARB's light-duty vehicle investments, requires ARB to include a long-term plan for CVRP and related programs in the FY 2016-17 Funding Plan. The plan must include: a three-year forecast of funding needs to support the goals of technology advancement, market readiness, and consumer acceptance of advanced vehicle technologies; a market and technology assessment; and an assessment of when a self-sustaining market is expected.

Staff's three-year forecast indicates a potential funding need for light-duty vehicle incentives in the range of \$210-240 million for FY 2016-17 growing to about \$300-400 million or more by FY 2018-19. Staff acknowledges a high degree of



uncertainty with these projections due to the early state of the ZEV market. However, the light-duty vehicle incentive funding proposed in this Funding Plan would meet staff's estimated FY 2016-17 need.

Findings from staff's market and technology assessment indicate positive signs regarding the state of the ZEV market. The assessment shows that vehicle technology costs are declining quicker than originally expected in most cases. Staff's assessment also shows growth in vehicle diversity, number of manufacturers selling vehicles, and consumer demand. CVRP-eligible vehicles now account for about 3 percent of annual passenger car sales in California. A more comprehensive technology assessment is being jointly conducted by ARB, U.S. Environmental Protection Agency, and National Highway Traffic and Safety Administration in support of ARB and federal motor vehicle regulations and is slated for release in June 2016. It will provide the most up-to-date technical information regarding the state of ZEV technology. This additional information will help inform future light-duty vehicle incentives planning.

Staff also proposes to use ZEV market penetration as a measure of ZEV market sustainability based on a well-established theory of technology adoption. Once annual sales reach about 16 percent of the light-duty vehicle market, staff believes that is an indicator that the market has penetrated the most difficult group of adopters for ensuring success of a technology and has reached sustainability. This equates to annual sales of about 200,000 vehicles in today's vehicle market. Given that sales of ZEVs and plug-in hybrids combined only reached around 60,000 in 2015, staff believes it will take at least another 5 to 10 years before this level of adoption is achieved. This provides a starting point for assessing when the ZEV market will be sustainable. Staff will re-assess this evaluation and adjust accordingly in future long-term plans as the market grows over time and new data become available.

As part of the long-term plan, staff recommends a number of metrics that could be used to measure progress toward this target. Staff also identifies mechanisms that could be used to ramp down incentives as the market matures as well as possible alternative incentive structures that could be considered in future years. However, staff believes it is premature to begin a ramp down this year because the market is still in its infancy. Accordingly, staff is not proposing any changes that would scale down CVRP in the FY 2016-17 funding cycle.

#### California Environmental Quality Act (CEQA) Requirements

ARB has determined that the proposed FY 2016-17 Funding Plan is exempt from the requirements of CEQA. ARB's certified regulatory program, which applies to the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality, has been certified by the California Secretary for Natural Resources under Public Resources Code section 21080.5 of CEQA (14 California Code of Regulations (CCR) 15251(d)). Public agencies with certified regulatory programs are exempt from certain CEQA requirements, including but not limited to, preparing environmental impact reports, negative

declarations, and initial studies. For activities that constitute project approvals, as those terms are used in CEQA, ARB, as a lead agency, prepares a substitute environmental document (referred to as an “Environmental Analysis” or “EA”) as part of the Staff Report prepared for a proposed action to comply with CEQA (17 CCR 60000-60008).

The proposed FY 2016-17 Funding Plan is a governmental funding mechanism which does not involve any commitment to any specific projects which may result in potentially significant impacts on the environment. Therefore, ARB has determined that the proposed FY 2016-2017 Funding Plan is not a project under CEQA (14 CCR 15378 (b)(4)) and is exempt from CEQA. If the FY 2016-17 Funding Plan is finalized, a Notice of Exemption will be filed with the State Clearinghouse for public inspection.

# PART I: PROPOSED INVESTMENTS

## CHAPTER 1: INTRODUCTION AND BACKGROUND

---

The Governor's proposed Fiscal Year (FY) 2016-17 State Budget includes \$500 million for Low Carbon Transportation and Fuels investments administered by the Air Resources Board (ARB or Board) from Cap-and-Trade auction proceeds deposited into the Greenhouse Gas Reduction Fund (GGRF). This funding would reduce greenhouse gas (GHG) emissions and further the purposes of Assembly Bill 32 (AB 32) (Núñez, Chapter 488, Statutes of 2006) with a priority on benefiting disadvantaged communities. At least half these funds would be invested to benefit disadvantaged communities, and at least 10 percent would be invested directly in disadvantaged communities. This proposal includes \$40 million to support the production of very low carbon fuels, a new addition to ARB's incentive programs. The Governor's proposed State Budget also includes \$28.6 million for the Air Quality Improvement Program (AQIP) which provides mobile source incentives to reduce emissions of criteria pollutants, toxic air contaminants, and GHGs. These funding proposals would build on the technology advancing projects ARB has funded in previous funding cycles.

The proposed *Fiscal Year 2016-17 Funding Plan for Low Carbon Transportation and Fuels Investments and AQIP* (FY 2016-17 Funding Plan) describes how these combined funds will be spent. The plan describes ARB's policy drivers and vision for advanced technology mobile source investments, eligible project categories and criteria, project funding allocations, and program implementation details. The plan also addresses the requirements of legislation signed in 2014 that refines ARB's implementation of these incentive programs.

ARB is using these incentives to accelerate development and deployment of the cleanest feasible vehicle technologies for all vehicle and equipment sectors, from light-duty passenger cars to heavy-duty trucks and off-road equipment to meet California's multiple climate change, air quality, and petroleum reduction goals including:

- Reducing GHG emissions to 1990 levels by 2020 as required by AB 32 and to 40 percent below 1990 levels by 2030 as directed in Governor Brown's Executive Order B-30-2015.<sup>1</sup>
- Reducing petroleum use in vehicles by 50 percent by 2030, one of the pillars of the State's climate change strategy for reducing GHG emissions identified by Governor Brown in his 2015 inaugural address.<sup>2</sup>

---

<sup>1</sup>Governor Brown's Executive Order B-30-2015: <http://gov.ca.gov/news.php?id=18938>

<sup>2</sup>Governor Brown's January 15, 2015 inaugural address: <http://www.gov.ca.gov/news.php?id=18828>

- Reducing GHG emissions from the transportation sector to 80 percent below 1990 levels by 2050 as directed in Governor Brown's Executive Order B-16-2012.<sup>3</sup>
- Meeting the federal health-based ambient air quality standards for ozone by 2023 and 2031 as well as the fine particulate matter (PM2.5) air quality standards.
- Meeting the goals of deploying 1 million zero-emission vehicles (ZEV) and near zero-emission vehicles by the start of 2023 as codified in Health and Safety Code Section 44258.4(b) and 1.5 million ZEVs by 2025 as directed in Executive Order B-16-2012.
- Reducing the carbon intensity of California's transportation fuels by 10 percent by 2020 as required by the Low Carbon Fuel Standard (LCFS).
- Continuing to reduce health risks from exposure to toxic air contaminants such as diesel particulate matter, particularly in disadvantaged communities where exposures can be substantial.

ARB's 2014 *First Update to the Climate Change Scoping Plan*<sup>4</sup> and 2016 *Mobile Source Strategy*<sup>5</sup> conclude that many of the same actions are needed to meet GHG, smog forming, and toxic pollutant emission reduction goals – specifically, a transition to zero-emission and near zero-emission technologies and use of the cleanest, lowest carbon fuels and energy across all vehicle and equipment categories. The *California Sustainable Freight Action Plan*, May 2016 draft, reiterates the need for this transition as it relates to the freight sector.<sup>6</sup> To support this transition, the Administration's first two Cap-and-Trade Auction Proceeds Investment Plans both identify zero-emission passenger transportation and low carbon freight transport as investment priorities.<sup>7</sup>

ARB is developing its Low Carbon Transportation and Fuels and AQIP investment strategy in a coordinated manner. The Low Carbon Transportation and Fuels investments build upon and greatly expand many of the types of projects that ARB has funded through AQIP since 2009. The investment strategy is also coordinated with other State agencies that are administering auction proceeds funding. ARB staff has developed this joint proposed FY 2016-17 Funding Plan for both funding sources as it did in previous budget cycles to ensure continued synergistic investments between the

<sup>3</sup>Governor Brown's Executive Order B-16-2012: <http://gov.ca.gov/news.php?id=17472>

<sup>4</sup>*First Update to the Climate Change Scoping Plan: Building on the Framework Pursuant to AB 32 The California Global Warming Solutions Act of 2006*, May 2014.

[http://www.arb.ca.gov/cc/scopingplan/2013\\_update/first\\_update\\_climate\\_change\\_scoping\\_plan.pdf](http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf)

<sup>5</sup>*Mobile Source Strategy*, May 2016. <http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.htm>

<sup>6</sup>*California Sustainable Freight Action Plan*, Discussion Draft, May 2016.

[http://www.casustainablefreight.org/app\\_pages/view/154](http://www.casustainablefreight.org/app_pages/view/154)

<sup>7</sup>Cap-and-Trade Auction Proceeds Second Investment Plan: Fiscal Years 2016-17 through 2018-19.

<http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/16-17-final-second-investment-planii.pdf>

Cap-and-Trade Auction Proceeds Investment Plan: Fiscal Years 2013-14 through 2015-16.

[http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final\\_investment\\_plan.pdf](http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_investment_plan.pdf)

programs while also ensuring that statutory requirements applicable to each are met. The Low Carbon Transportation and Fuels investments account for about 95 percent of the funds covered in the FY 2016-17 Funding Plan.

The remainder of this introductory chapter provides background on Low Carbon Transportation and AQIP including a summary of projects funded to date. This is followed by chapters covering proposed FY 2016-17 funding allocations, light-duty vehicle investments, heavy-duty vehicle investments, very low carbon fuels investments, approaches to maximize disadvantaged community benefits for Low Carbon Transportation and Fuels investments, and contingency provisions. The second part of the Funding Plan covers the long-term plan for the Clean Vehicle Rebate Project (CVRP) and light-duty incentives required by Senate Bill 1275 (SB 1275) (De León, Chapter 530, Statutes of 2014).

### **CAP-AND-TRADE AUCTION PROCEEDS AND LOW CARBON TRANSPORTATION BACKGROUND**

Cap-and-Trade auction proceeds provide an opportunity for the State to invest in projects that help California achieve its climate change goals and provide benefits to disadvantaged communities. These investments are collectively known as California Climate Investments. These provide funding for ARB's advanced technology, clean transportation incentive programs that reduce GHG emissions, expanding the types of projects ARB has funded through AQIP since 2009 and providing funding for very low carbon fuels for the first time in the FY 2016-17 cycle.

In 2012, the Legislature passed and Governor Brown signed into law 3 auction proceeds related bills – AB 1532 (Pérez, Chapter 807), SB 535 (de León, Chapter 830), and SB 1018 (Budget and Fiscal Review Committee, Chapter 39). These bills establish GGRF to receive the State's portion of auction proceeds and provide the framework for how California Climate Investments will be administered to further the purposes of AB 32. The use of auction proceeds must also comply with the requirements of SB 862 (Committee on Budget and Fiscal Review, Chapter 36, Statutes of 2014).

The primary purpose of auction proceeds funded programs is achieving GHG emission reductions. The implementing legislation specifies broad categories of GHG emission reducing projects that may be funded with these proceeds, including investments in: clean and efficient energy; low carbon transportation; natural resource conservation and management and solid waste diversion; and sustainable infrastructure and strategic planning. This legislation also establishes complementary goals for auction proceeds investments in addition to the goal of reducing GHG emissions in California including maximizing economic, environmental, and public health benefits, among others.

Disadvantaged Community Investment Requirements and Program Guidance: SB 535 directs that at least 25 percent of auction proceeds funding be allocated toward projects that benefit California's most disadvantaged communities and at least 10 percent be allocated toward projects located in these disadvantaged communities in order to provide economic benefits as well as health benefits through additional emission

reductions. The California Environmental Protection Agency (Cal/EPA) identified disadvantaged communities for the purposes of SB 535 using the California Communities Environmental Health Screening Tool (CalEnviroScreen2.0). More information on the CalEnviroScreen model and the identification of disadvantaged communities is available on Cal/EPA's website.<sup>8</sup>

In 2015, ARB approved the *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies that Administer California Climate Investments* (California Climate Investments Guidelines) establishing the requirements that State agencies receiving Cap-and-Trade auction proceeds must follow as they implement their programs.<sup>9</sup> These guidelines define the criteria for determining whether projects qualify as being located in or benefiting a disadvantaged community. The guidelines also identify approaches for implementing State agencies to maximize benefits to disadvantaged communities, while recognizing additional priorities identified by disadvantaged communities (in addition to reducing GHG emissions) that State agencies should strive to achieve with their investments. These include reducing health harms and exposure to toxic air contaminants among other needs. Chapter 6 of this Funding Plan includes a discussion of the steps ARB is taking to maximize disadvantaged community benefits for the proposed FY 2016-17 Low Carbon Transportation and Fuels appropriation.

Auction Proceeds Allocation Process: The implementing statute establishes a two-step process for allocating funding to State agencies to invest in GHG reducing projects. Department of Finance, in consultation with ARB, is required to submit to the Legislature a three-year investment plan identifying proposed investments of auction proceeds. To date, the administration has prepared two investment plans. The first, submitted to the Legislature in 2013, covered FY 2013-14 through 2015-16. The second, submitted to the Legislature in January 2016, covers FY 2016-17 through 2018-19. Both investment plans identified low carbon transportation, including zero-emission passenger transportation and zero-emission and near zero-emission freight transport, as investment priorities. Funding is appropriated to State agencies by the Legislature through the annual Budget Act, consistent with the investment plan.

ARB Low Carbon Transportation Appropriations: The Legislature has appropriated a total of \$325 million to ARB for Low Carbon Transportation investments to date:

- FY 2013-14: The Legislature appropriated \$30 million to ARB in SB 862 (Chapter 36, Statutes of 2014), specifying that \$20 million be allocated to CVRP and \$10 million be allocated to the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).
- FY 2014-15: The Legislature appropriated \$200 million to ARB for Low Carbon Transportation in SB 852 (Leno, Chapter 25, Statutes of 2014). Projects include:

---

<sup>8</sup><http://www.calepa.ca.gov/EnvJustice/GHGInvest/>

<sup>9</sup>*Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies that Administer California Climate Investment*, December 21, 2015. <http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/arb-funding-guidelines-for-ca-climate-investments.pdf>

rebates and vouchers for low carbon cars, trucks, and buses through CVRP and HVIP; zero-emission truck and bus pilots; pilots designed to increase access to the cleanest vehicles in lower-income households and benefit disadvantaged communities; and advanced technology demonstrations of freight equipment. In the FY 2014-15 Funding Plan, ARB committed to invest at least half these funds to benefit disadvantaged communities.<sup>10</sup>

- FY 2015-16: The Governor proposed \$350 million in Low Carbon Transportation funding for ARB to continue and expand on the projects funded in FY 2014-15. In June 2015, the Board approved the FY 2015-16 Funding Plan allocating these proposed funds to a suite of 12 light-duty vehicle and heavy-duty vehicle and equipment projects.<sup>11</sup> At the time of the Board meeting, the Legislature had not yet acted on the Governor's Cap-and-Trade auction proceeds proposal, so the Funding Plan remained contingent upon appropriation of funds.

The Legislature ultimately appropriated \$95 million to ARB for Low Carbon Transportation in SB 101 (Chapter 321, Statutes of 2015) signed into law in September 2015. This appropriation included \$90 million for projects and \$5 million for State operations. In October 2015, the Board approved a modification to the FY 2015-16 Funding Plan allocating the \$90 million in project funds to continue 3 ongoing projects in order to avoid implementation disruptions: \$75 million for CVRP; \$10 million for Enhanced Fleet Modernization Program (EFMP) Plus-up Pilot Project (car scrap and replacement); and \$5 million for HVIP.<sup>12</sup> ARB has committed to invest at least 40 percent of FY 2015-16 funds to benefit disadvantaged communities and at least 10 percent directly in disadvantaged communities.

Table 1 provides a summary of the projects ARB is funding with these Low Carbon Transportation appropriations. ARB staff has estimated the percentage of funds benefiting disadvantaged communities. These estimates are based on data reported in the March 2016 *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds* and the terms of each project solicitation and/or grant agreement projected forward to full expenditure of funds.<sup>13</sup> More than 50 percent of the funds are providing benefits in disadvantaged communities, and more than 10 percent of the funds are being invested in these communities.

---

<sup>10</sup> *Fiscal Year 2014-15 Funding Plan for the Air Quality Improvement Program and Low Carbon Transportation Greenhouse Gas Reduction Fund Investments*, approved June 26, 2014. [http://www.arb.ca.gov/msprog/aqip/fundplan/final\\_fy1415\\_aqip\\_ggrf\\_fundingplan.pdf](http://www.arb.ca.gov/msprog/aqip/fundplan/final_fy1415_aqip_ggrf_fundingplan.pdf)

<sup>11</sup> *Fiscal Year 2015-16 Funding Plan for Low Carbon Transportation Investments and the Air Quality Improvement Program*, approved June 25, 2015. [http://www.arb.ca.gov/msprog/aqip/fundplan/proposed\\_fy15-16\\_funding\\_plan.pdf](http://www.arb.ca.gov/msprog/aqip/fundplan/proposed_fy15-16_funding_plan.pdf)

<sup>12</sup> *Notice of Public Meeting to Consider a Modification to the Fiscal Year 2015-16 Funding Plan for Low Carbon Transportation Investments and the Air Quality Improvement Program*, October 9, 2015. [http://www.arb.ca.gov/msprog/aqip/fundplan/final\\_meeting\\_notice\\_october15.pdf](http://www.arb.ca.gov/msprog/aqip/fundplan/final_meeting_notice_october15.pdf)

<sup>13</sup> *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds*, March 2016. <http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/annualreport.htm>

**Table 1: Low Carbon Transportation Project Allocations to Date** (FY 2013-14, 2014-15, and 2015-16)

Project	Allocation (millions)	% In Disadvantaged Communities	% Benefiting Disadvantaged Communities	Project Outcomes <sup>1</sup>
<b>Light-Duty Vehicle Investments (SB 1275)</b>				
CVRP	\$204	6% <sup>2</sup>	37% <sup>2</sup>	93,000 rebates for battery electric, plug-in hybrid, and fuel cell electric vehicles
Light-Duty Pilot Projects to Benefit Disadvantaged Communities				
EFMP Plus-up	\$12	70% <sup>2</sup>	100% <sup>3</sup>	2,900 vehicles scrapped and replaced
Car Sharing and Mobility Options	\$3	100% <sup>3</sup>	100% <sup>3</sup>	Establish 2 new car sharing projects to serve about 8,000 disadvantaged community residents in Los Angeles and Sacramento
Increased Public Fleet Incentives for CVRP-Eligible Vehicles	\$3	38% <sup>2</sup>	100% <sup>3</sup>	400 rebates for public fleets operating in and near disadvantaged communities to buy battery electric, plug-in hybrid, and fuel cell electric vehicles
Financing Assistance	\$1	Too early to estimate <sup>4</sup>	100% <sup>3</sup>	Establish program to help lower-income consumers in and near disadvantaged communities in Bay Area obtain financing to purchase advanced technology vehicles, supporting about 100 purchases
<b>Heavy-Duty Vehicle and Off-Road Equipment Investments (SB 1204)</b>				
HVIP	\$20	45% <sup>2</sup>	65% <sup>2</sup>	560 vouchers for hybrid and zero-emission trucks and buses
Zero-Emission Truck and Bus Pilot Commercial Deployment	\$25	Too early to estimate <sup>4</sup>	100% <sup>3</sup>	Funding for 20 zero-emission trucks and buses and supporting infrastructure and work force training
Advanced Technology Freight Demonstrations <ul style="list-style-type: none"> <li>• Multi-source freight facilities</li> <li>• Zero-emission drayage trucks</li> </ul>	\$49	50% <sup>3</sup>	100% <sup>3</sup>	<ul style="list-style-type: none"> <li>• Demonstrate about 40 pieces of zero-emission equipment with associated infrastructure at a terminal at Port of Los Angeles and 3 freight facilities in San Bernardino County</li> <li>• Demonstrate about 40 zero-emission drayage trucks with associated infrastructure serving ports and freight facilities in South Coast, Bay Area, San Joaquin Valley, and Sacramento</li> </ul>
State Operations	\$8	-	-	
<b>Total</b>	<b>\$325</b>	<b>18%</b>	<b>56%</b>	

All project allocations rounded to nearest \$million.

<sup>1</sup>Projected outcomes are estimated based on full expenditure of funds.

<sup>2</sup>Estimate based on rebates/vouchers issued to date as reported in the March 2016 *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds* projected forward to full expenditure of funds. Will be updated after all funds expended.

<sup>3</sup>Based on terms of project solicitation and/or grant agreement.

<sup>4</sup>Insufficient data yet to determine. Will be calculated based on project implementation and reported in future Annual Reports to the Legislature.



## **AQIP BACKGROUND**

AQIP is a mobile source incentive program that focuses on reducing criteria pollutant and diesel particulate emissions with concurrent reductions in GHG emissions. ARB investments initiated under AQIP provide the foundation for the Low Carbon Transportation investments that now make up the vast majority of the proposed Funding Plan. AQIP was created in 2007 by AB 118 (Núñez, Chapter 750, Statutes of 2007). AB 8 (Perea, Chapter 401, Statutes of 2013) reauthorized the fees that support AQIP through 2023. AB 8 also requires ARB to provide preference to projects with higher benefit-cost scores when considering projects for AQIP funding. A detailed discussion of the benefit-cost analysis and selection process for AQIP projects is provided in Appendix A of this Funding Plan.

Funding for AQIP comes primarily from the smog abatement fee assessed annually by the Department of Motor Vehicles (DMV) during a vehicle's first six registration years in lieu of a biennial smog inspection. A small portion of AQIP funding comes from two additional sources: an initial registration fee for new watercraft and a special equipment identification plate fee for certain types of equipment. AQIP has an annual budget of about \$25-30 million. For FY 2016-17, the Governor's proposed Budget includes \$28.6 million for AQIP projects.

ARB adopted regulations in 2008 and 2009 that establish the administrative procedures for implementing AQIP in order to ensure that the program is run efficiently, with transparency and public input, and complements California's existing air quality and climate change programs. Central to these program guidelines is the requirement for a Board-approved annual funding plan developed with public input. AQIP guidelines also establish the rules and requirements for soliciting projects and awarding funds.

AQIP has provided funding for CVRP, HVIP, and demonstrations for advanced emission reduction vehicle technologies since 2009. In recent years, these projects have been primarily funded from the Low Carbon Transportation appropriations because demand has exceeded AQIP's budget, and the majority of AQIP funds have been directed to the Truck Loan Assistance Program which helps small business truckers to secure financing for newer trucks and diesel exhaust retrofits to meet compliance deadlines for ARB's In-Use Truck and Bus Regulation.

Table 2 provides a summary of AQIP investments to date including one-time funding provided in various years to help meet demand. Note that in FY 2013-14, FY 2014-15, and FY 2015-16, CVRP and HVIP received funding from both AQIP and Low Carbon Transportation.

**Table 2: AQIP Project Allocations by Year<sup>1</sup>**

AQIP Project	Project Allocations by Fiscal Year (million)								
	2008 -09	2009 -10	2010 -11	2011 -12	2012 -13	2013 -14	2014 -15	2015 -16	Total
Truck Loan Assistance	\$30				\$4	\$20	\$10	\$18	<b>\$82</b>
CVRP <sup>2</sup>		\$4	\$7	\$16	\$36	\$40	\$10	\$3	<b>\$116<sup>2</sup></b>
HVIP <sup>2</sup>		\$20	\$23	\$11		\$5	\$5		<b>\$64<sup>2</sup></b>
Low NOx Engine Incentives								\$2	<b>\$2</b>
Agricultural Equipment Trade Up in the San Joaquin Valley								\$0.5	<b>\$0.5</b>
Advanced Technology Demonstration/Vehicle Testing		\$1.9	\$1.7	\$1.6	\$1				<b>\$6</b>
Lawn and Garden Equipment Replacement		\$1.6	\$1						<b>\$3</b>
Off-Road Hybrid Equipment Pilot			\$2						<b>\$2</b>
Zero-Emission Agricultural Utility Equipment		\$0.1							<b>\$0.1</b>
<b>TOTAL</b>	<b>\$30</b>	<b>\$28</b>	<b>\$35</b>	<b>\$29</b>	<b>\$42</b>	<b>\$65</b>	<b>\$25</b>	<b>\$23</b>	<b>\$276</b>
Air Quality Improvement Fund	\$30	\$28	\$29	\$29	\$29	\$25	\$20	\$23	\$213
Other funding sources <sup>1</sup>	-	-	\$6	-	\$13	\$40	\$5	-	\$63

All project allocations rounded to nearest \$ million, except for projects allocated less than \$2 million. Rows and columns may not sum to totals due to rounding.

<sup>1</sup>Includes a total of \$63 million from other funding sources: \$53 million from the California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program or Fund to support CVRP and HVIP in various fiscal years and \$10 million appropriated to Truck Loan Assistance Program in FY 2013-14 as a loan from the Vehicle Inspection and Repair Fund per SB 359 (Corbett, Chapter 415, Statutes of 2013).

<sup>2</sup>CVRP and HVIP also received Low Carbon Transportation funds in FY 2013-14, 2014-15, 2015-16 as shown in Table 1.

The California Energy Commission (Energy Commission) has augmented the funds directly appropriated to ARB by previously providing \$53 million from its Alternative and Renewable Fuel and Vehicle Technology Program and Fund for CVRP and HVIP to meet consumer demand as shown in Table 2. In addition to these direct investments, the Energy Commission's investments in fueling infrastructure for both electric vehicle charging stations and hydrogen fueling stations, vehicle manufacturing, and advanced technology vehicle demonstrations as part of the Alternative and Renewable Fuel and Vehicle Technology Program provide critical support to the deployment of these zero-emission vehicles. Furthermore, the Alternative and Renewable Fuel and Vehicle Technology Program also provides key investments in low carbon biofuel production and infrastructure, natural gas vehicle deployment, and workforce training and development which furthers progress towards California's climate change, air quality, and petroleum reduction goals.

## **ADDITIONAL LEGISLATION GUIDING FUNDING PLAN DEVELOPMENT AND PROGRAM IMPLEMENTATION**

Two bills signed into law in 2014 provide additional guidance in ARB's implementation of these programs and specify requirements for the Funding Plan.

SB 1275 (De León, Chapter 530, Statutes of 2014) establishes the Charge Ahead California Initiative with the goals of placing one million zero-emission and near zero-emission vehicles in California by 2023 and increasing access to these vehicles for lower-income consumers and consumers in disadvantaged communities. It also identifies the Cap-and-Trade auction proceeds as a funding source that could be utilized to meet the provisions established in the Charge Ahead California Initiative.

- SB 1275 directs ARB to make a number of changes to CVRP including limiting consumer eligibility based on income and considering incorporating pre-qualification and point-of-sale mechanisms in CVRP. The Board approved an income cap and higher CVRP rebate amounts for lower-income consumers as part of the FY 2015-16 Funding Plan, and these changes went into effect in spring 2016. Staff is continuing to work through issues related to incorporating a pre-qualification/point-of-sale mechanism into CVRP but proposes that a pre-qualification element be implemented during the FY 2016-17 funding cycle as discussed in Chapter 3 of this Funding Plan.
- SB 1275 also directs ARB to establish programs to increase access to electric transportation for disadvantaged, low-income, and moderate-income communities and consumers. ARB has funded these types of projects since FY 2014-15 and is proposing increased funding for the FY 2016-17 funding cycle as discussed in Chapter 3 of this Funding Plan.
- Finally, SB 1275 requires ARB to include a long-term plan for CVRP and related programs as part of the FY 2016-17 Funding Plan. Staff's proposed long-term plan is presented in Part II of this Funding Plan.

SB 1204 (Lara, Chapter 524, Statutes of 2014) creates the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program, funded with Cap-and-Trade auction proceeds, intended to help accelerate the introduction of the next generation of cleaner heavy-duty vehicles and engines with a priority on projects that benefit disadvantaged communities. SB 1204 establishes specific requirements related to how ARB prioritizes project categories and selects projects which ARB addressed in the FY 2015-16 Funding Plan. SB 1204 also directs ARB to develop an annual framework and plan to guide these investments. ARB's actions to address the requirements of SB 1204 are discussed in greater detail in Chapter 4 and Appendix B of this Funding Plan.

## **CHAPTER 2: PROPOSED FUNDING ALLOCATIONS FOR FY 2016-17**

---

The Governor's FY 2016-17 State Budget proposals for Low Carbon Transportation and Fuels investments and AQIP along with ARB staff's proposed funding allocations for these programs are summarized in this chapter.

### **LOW CARBON TRANSPORTATION AND FUELS PROJECT ALLOCATIONS**

The Governor's proposed 2016-17 State Budget would appropriate \$500 million in Cap-and-Trade auction proceeds to ARB for Low Carbon Transportation and Fuels investments. At least 50 percent of these funds would be invested to benefit disadvantaged communities and at least 10 percent would be invested directly in disadvantaged communities. This proposal includes \$40 million for very low carbon fuel production incentives, a new element to ARB's Low Carbon Transportation and Fuels incentive program. As described in the Governor's January 2016 Budget Summary, these funds are to: "provide incentives for low carbon freight and passenger transportation, including rebates for zero-emission cars, vouchers for hybrid trucks and zero-emission trucks and buses." State operations funding accounts for \$5 million of the \$500 million proposed appropriation, so \$495 million would be available to allocate to projects.

ARB staff proposes the project category allocations shown in Tables 3 and 4 building on previous years' investments. These proposed investments would:

- Meet expected demand for consumer driven, first-come, first-served projects including CVRP, EFMP Plus-up scrap and replace incentives, HVIP, and the new incentives for low NOx truck and bus engines just coming to market. The proposal includes funding to meet the remaining CVRP and HVIP consumer demand from the FY 2015-16 cycle.
- Increase funding for the light-duty vehicle projects designed to increase access to clean transportation for lower-income Californians and disadvantaged communities consistent with the goals for SB 1275.
- Carry forward the unfunded heavy-duty vehicle and equipment project categories from the FY 2015-16 Funding Plan, refining them where necessary based on information learned over the past year. These include advanced technology demonstration projects, zero-emission truck and bus commercial pilots, and a new rural school bus pilot project. Because of the smaller than anticipated Low Carbon Transportation appropriation for the FY 2015-16 cycle, ARB only allocated \$5 million of the \$148 million proposed for heavy-duty projects.
- Provide funding for a new very low carbon fuel production incentive project. This is the first time fuels are included in ARB's Low Carbon Transportation program.

- Exceed the minimum targets to invest 10 percent of the funds in disadvantaged communities and 50 percent to benefit disadvantaged communities.

**Table 3: Proposed Low Carbon Transportation and Fuels Project Allocations**

Low Carbon Transportation and Fuels Project Category	Project Allocation (millions)	Minimum Disadvantaged Community Benefit
<b>Light-Duty Vehicles Investments (SB 1275)<sup>1</sup></b>		
CVRP Remaining 2015-16 Demand (Through Sept 2016) - \$55M 2016-17 Demand (Oct 2016-Sept 2017) - \$175M	\$230	≥33%
Light-Duty Pilot Projects to Benefit Disadvantaged Communities Enhanced Fleet Modernization Program (EFMP) Plus-Up - \$30M Car Sharing and Mobility Options - \$8M Increased Public Fleet Incentives for CVRP-Eligible Vehicles - \$3M Agricultural Worker Vanpools in San Joaquin Valley - \$3M	\$44	100%
Financing Assistance for Lower-Income Consumers	\$6	≥50%
<b>Light-Duty Vehicle Investment Total</b>	<b>\$280</b>	
<b>Heavy-Duty Vehicles and Off-Road Equipment Investments (SB 1204)<sup>1</sup></b>		
Advanced Technology Demonstration Projects	\$59	100%
Zero-Emission Freight Equipment Pilot Commercial Deployment Project	\$5	≥50%
Zero-Emission Truck Pilot Commercial Deployment Project	\$18	≥75%
Zero-Emission Bus Pilot Commercial Deployment Project	\$42	≥75%
Rural School Bus Pilot Project	\$10	to be determined
Low NOx Engine Incentives with Renewable Fuel	\$23	≥50%
HVIP Remaining 2015-16 Demand (Through Sept 2016) - \$5M 2016-17 Demand (Oct 2016-Sept 2017) - \$13M	\$18	≥60%
<b>Heavy-Duty Vehicle and Off-Road Equipment Investment Total</b>	<b>\$280</b>	
<b>Fuels</b>		
Very Low Carbon Fuels Production Incentive Project	\$40	to be determined
<b>State Operations</b>	<b>\$5</b>	
<b>TOTAL</b>	<b>\$500</b>	<b>≥50%</b>

<sup>1</sup>SB 1275 (de León) guides these light-duty vehicle investments, so they are known to some stakeholders as the “SB 1275 program.” SB 1204 (Lara) guides these heavy-duty investments, so they are known to some stakeholders as the “SB 1204 program.”

Disadvantaged Community Investment Targets: As shown in Table 3, these proposed allocations would direct at least 50 percent of the \$500 million appropriation to projects that benefit disadvantaged communities. Staff considers the 50 percent target a floor and expects that some of these projects will deliver more benefits to disadvantaged communities.

Table 4 shows how the Funding Plan would ensure that at least 10 percent of the \$500 million appropriation is invested in disadvantaged communities. Staff proposes placing conditions in the solicitations and/or grant agreements for the projects listed in Table 4 to ensure that at least 10 percent of the total funds (at least \$50 million) are invested directly in disadvantaged communities.

**Table 4: Targets for Low Carbon Transportation and Fuels Investments in Disadvantaged Communities**

<b>Low Carbon Transportation and Fuels Project Category</b>	<b>Minimum Investment in Disadvantaged Communities (millions)</b>
Light-Duty Pilot Projects to Benefit Disadvantaged Communities	≥\$25
Advanced Technology Demonstration Projects	≥\$10
Zero-Emission Bus Pilot Commercial Project	≥\$20
<b>TOTAL</b>	<b>≥\$55</b>

Staff considers the 10 percent target a floor and expects to exceed it. Staff expects that at least a portion of the funding for every project will be invested in disadvantaged communities. These will be calculated and reported in annual reports to the Legislature after funds are awarded and spent. When those investments are added to the commitments shown in Table 4, the Low Carbon Transportation and Fuels funding spent in disadvantaged communities will exceed the 10 percent target.

#### **AQIP PROJECT ALLOCATIONS**

The Governor's proposed 2016-17 State Budget would appropriate \$28.6 million to ARB for AQIP projects. This funding level is based on motor vehicle fee revenues. ARB staff proposes allocating \$25 million to AQIP projects, and setting aside \$3.6 million as a prudent reserve for revenue uncertainty consistent with previous budget cycles. Staff proposes directing AQIP funding to projects that primarily provide criteria pollutant and toxics benefits. Table 5 shows the proposed AQIP project allocations.

**Table 5: Proposed AQIP Project Allocations**

<b>AQIP Project Category</b>	<b>Project Allocation (millions)</b>
Truck Loan Assistance Program	\$22
Agricultural Equipment Trade-Up Pilot in the San Joaquin Valley	\$3
Reserve for Revenue Uncertainty	\$3.6
<b>TOTAL</b>	<b>\$28.6</b>

Most AQIP funds would be directed to the Truck Loan Assistance Program as has been the case in recent budget cycles to meet expected increased consumer demand. This program helps small business truckers to secure financing for newer trucks and diesel exhaust retrofits to meet compliance deadlines for ARB's In-Use Truck and Bus Regulation. Staff also recommends funding to scale up the Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley started in FY 2015-16.

Staff proposes the following contingency provisions specifying how the \$3.6 million in reserve funds would be allocated if revenues are sufficient. If the Executive Officer determines that AQIP funds in excess of \$25 million are available to allocate, he could direct that funding to either of the two projects listed in Table 5 if there is demonstrated demand as a first priority. As a second priority, he could direct a portion of that funding to research related to the mobile source emission categories covered in the Funding Plan consistent with the provisions of Health and Safety Code Section 44274(c) if there are still remaining funds available.

### **FUNDING PLAN DEVELOPMENT PROCESS**

To develop the recommendations presented in the proposed FY 2016-17 Funding Plan, staff held 3 public workshops, 15 public work group meetings, and numerous individual meetings with interested stakeholders. Table 6 summarizes these public meetings. Staff released a discussion document on March 25, 2016 summarizing its draft funding recommendations to help guide discussions at the April 4, 2016 public workshop.

**Table 6: Public Meetings on Development of FY 2016-17 Funding Plan**

<b>Date</b>	<b>Meeting</b>
12/08/2015	Public Workshop on the Long-Term Plan for CVRP and Light-Duty Vehicle Incentives Required by SB 1275
1/27/2016	Public Workshop on Development of the FY 2016-17 Funding Plan
2/5/2016	Public Work Group Meeting: CVRP Long-Term Plan – 3 Year Forecast
2/5/2016	Public Work Group Meeting: Light-Duty Pilot Projects to Benefit Disadvantaged Communities and Lower-Income Consumers
2/11/2016	Public Work Group Meeting: Heavy-Duty and Off-Road Projects
2/11/2016	Public Work Group Meeting: Very Low Carbon Fuels
2/12/2016	Public Work Group Meeting: CVRP Long-Term Plan – Technology/Market Assessment
2/18/2016	Public Work Group Meeting: HVIP
2/19/2016	Public Work Group Meeting: CVRP Long-Term Plan – Market Sustainability
2/23/2016	Public Work Group Meeting: CVRP Project Structure
2/25/2016	Public Work Group Meeting: Light-Duty Pilot Projects to Benefit Disadvantaged Communities and Lower-Income Consumers
3/3/2016	Public Work Group Meeting: Very Low Carbon Fuels
3/9/2016	Public Work Group Meeting: CVRP Project Structure
3/10/2016	Public Work Group Meeting: Light-Duty Vehicle Financing Assistance
3/11/2016	Public Work Group Meeting: EFMP Plus-up
3/18/2016	Public Work Group Meeting: CVRP Project Structure
4/4/16	Public Workshop on Development of the FY 2016-17 Funding Plan
4/19/16	Public Work Group Meeting: Very Low Carbon Fuels

Staff also continues to coordinate with the California Air Pollution Control Officers Association, local air districts, and other State agencies that implement related incentive programs including the Energy Commission, Calrecycle, and the California Department of Food and Agriculture (CDFA).

## CHAPTER 3: LIGHT-DUTY VEHICLE INVESTMENTS (SB 1275)

---

This chapter presents staff's proposal for light-duty vehicle investments utilizing Low Carbon Transportation and Fuels funding, including continued funding for CVRP, Light-Duty Pilot Projects to Benefit Disadvantaged Communities, and Financing Assistance for Lower-Income Consumers.

### Policy and Statutory Drivers

The light-duty fleet will need to become largely zero-emission by 2050 (and fueled by low carbon, renewable energy sources) with a mix of battery electric and fuel cell vehicles in order to meet California's climate change and air quality emission reduction goals. The need for this transformation is highlighted in ARB's *First Update to the Climate Change Scoping Plan* and *Mobile Source Strategy*. There are a number of regulatory, policy, and statutory drivers that set interim milestones along the path to this transformation of the light-duty vehicle fleet.

ARB's ZEV Regulation: The introduction and deployment of ZEVs in California was first driven by, and continues to be driven by, ARB's ZEV regulation which requires auto manufacturers to produce increasing numbers of ZEVs for sale in California.

Governor's Executive Order for ZEV Deployment: In Executive Order B-16-2012, Governor Brown set a goal of deploying 1.5 million ZEVs in California by 2025, complementing and building upon ARB's ZEV regulation.

SB 1275: As noted earlier in the Funding Plan, the Legislature created the Charge Ahead California Initiative as part of SB 1275 codifying in statute the goals of:

- Deploying 1 million ZEVs and near zero-emission vehicles in California by the start of 2023.
- Establishing a self-sustaining California market where these vehicles are a mainstream option.
- Increasing access for disadvantaged, low-income, and moderate-income communities and consumers to these vehicles.

ARB's light-duty vehicle investments are aimed at supporting the long-term transformation of the fleet and meeting each of these policy, statutory, and regulatory goals and requirements. There are two distinct, but complementary elements to ARB's advanced technology light-duty vehicle investments:



- CVRP supports increasing the number of ZEVs on California's roadways to meet these deployment goals and achieve the large scale transformation of the fleet.
- Light-Duty Pilot Projects are designed to increase access to these clean vehicles in disadvantaged communities and lower-income households. These pilot projects provide opportunities for ownership through vehicle retirement and replacement incentives and financing assistance as well as access to clean vehicles in disadvantaged communities through car sharing and other mobility option improvement programs. SB 1275 directs ARB to fund these types of projects.

ARB's light-duty vehicle deployment investments are complemented by parallel Energy Commission investments in the necessary ZEV charging and fueling infrastructure. The Energy Commission has invested over \$40 million in electric vehicle charging infrastructure for 7,500 charging stations and \$96 million for 449 hydrogen fueling stations through the Alternative and Renewable Fuel and Vehicle Technology Program. For FY 2016-17, the Energy Commission allocated an additional \$17 million for electric vehicle charging infrastructure and \$20 million for hydrogen fueling infrastructure.<sup>14</sup> The Energy Commission also provides funding to support the development of regional readiness plans to help regions prepare for and expedite deployment of ZEVs and in-state production of zero- and near zero-emission vehicles and components.

In addition to staff's proposed investments for the FY 2016-17 funding cycle, Part II of this Funding Plan presents staff's proposed long-term plan for CVRP and related programs. SB 1275 requires ARB to include a long-term plan for light-duty vehicle incentives in this year's Funding Plan. The plan must include: a three-year forecast of funding needs to support the goals of technology advancement, market readiness, and consumer acceptance of advanced vehicle technologies; a market and technology assessment; and an assessment of when a self-sustaining market is expected.

Staff's assessment shows that ZEV technology costs are declining quicker than originally expected, in most cases. The assessment also shows growth in vehicle diversity, number of manufacturers selling vehicles, and consumer demand. CVRP-eligible vehicles now account for about 3 percent of annual passenger car sales in California. These are all positive signs regarding the state of the ZEV market and technology development. As part of the long-term plan, staff recommends a number of metrics that could be used to measure progress toward market sustainability. Staff also identifies mechanisms that could be used to ramp down incentives as the market matures as well as possible alternative incentive structures that could be considered in future years. However, staff believes it is premature to begin a ramp down at this time because the market is still in its infancy. Accordingly, staff is not proposing any changes that would scale down CVRP in FY 2016-17.

---

<sup>14</sup>California Energy Commission, *2016-17 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program*, Commission Report, May 2016.  
<http://www.energy.ca.gov/2015publications/CEC-600-2015-014/CEC-600-2015-014-CMF.pdf>

## **CVRP**

Proposed Low Carbon Transportation Allocation – \$230 million

Remaining FY 2015-16 Demand (through September 2016) – \$55 million

FY 2016-17 (October 2016-September 2017) – \$175 million

### **PROJECT OVERVIEW**

CVRP offers vehicle rebates on a first-come, first-served basis for light-duty ZEVs, plug-in hybrid electric vehicles (PHEVs), zero-emission motorcycles, and neighborhood electric vehicles. CVRP helps get the cleanest vehicles on the road in California by providing consumer rebates to partially offset the higher initial cost of these advanced technologies. The objective of CVRP is to support the widespread commercialization of the cleanest vehicles by helping to motivate consumer purchase decisions. To this end, consumer outreach and education is a key part of CVRP.

Currently, the base CVRP rebate amounts are \$5,000 for fuel cell electric vehicles, \$2,500 for battery electric vehicles (BEVs), \$1,500 for PHEVs, and \$900 for zero-emission motorcycles and neighborhood electric vehicles. In March 2016, rebate amounts increased for lower-income consumers (with household incomes of less than or equal to 300 percent of the federal poverty level) by \$1,500 to \$6,500 for fuel cell electric vehicles, \$4,000 for BEVs, and \$3,000 for PHEVs. An income cap was also instituted to exclude higher-income consumers in March 2016 as required by SB 1275. The income cap excludes individuals with gross annual incomes greater than \$250,000, head-of-household filers with gross incomes greater than \$340,000, and joint filers with gross incomes greater than \$500,000.

### **CURRENT PROJECT STATUS**

As of March 31, 2016, CVRP has provided rebates for about 147,000 vehicles totaling over \$325 million since the project's launch in 2010. About 60 percent of rebates have been issued for BEVs and 40 percent for PHEVs to date, and only a small number of rebates have been issued for fuel cell electric vehicle, neighborhood electric vehicles, and zero-emission motorcycles. Since the beginning of the program, CVRP has helped support the growth of a diverse advanced technology light-duty vehicle market. During the first two years of the project, only four passenger vehicle models were eligible. That has grown to more than 35 models of eligible vehicles now available to consumers, with more vehicle introductions planned in the current and upcoming years. CVRP-eligible vehicles now account for about 3 percent of California passenger car sales annually.

Consumer demand has also grown, and in December 2015, CVRP reached a new record of 5,400 rebates issued/reserved totaling approximately \$12 million in one month. Moreover, staff expects that the clean vehicle market will continue to grow as consumer choices in vehicle price and range options expand. Table 7 provides a summary of rebates issued by vehicle type and model.

**Table 7: Rebates by Vehicle Types and Model**

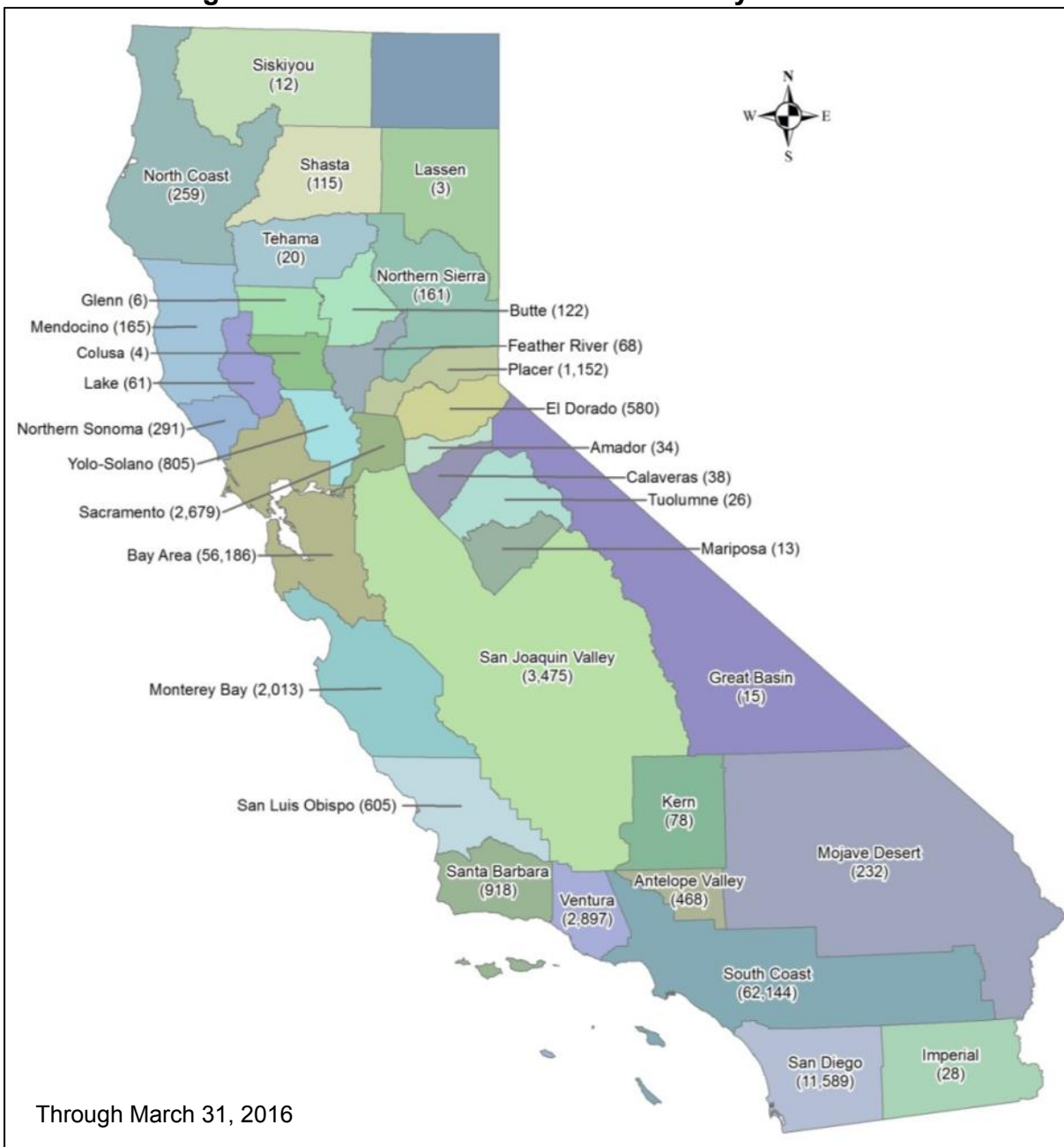
<b>Vehicle Type and Model</b>	<b>Rebates</b>	<b>Total Dollars</b>	<b>% of Rebates</b>	<b>% of Funding</b>
<b>Battery Electric Vehicles</b>	<b>87,270</b>	<b>\$221,918,000</b>	<b>59%</b>	<b>71%</b>
BMW 1 Series Active E	70	\$52,000	0.0%	0.0%
BMW i3	1,260	\$3,142,000	0.9%	1.0%
BMW i3 REx	3,200	\$8,000,000	2.2%	2.6%
Chevrolet Spark EV	3,410	\$8,530,000	2.3%	2.7%
CODA	50	\$122,000	0%	0%
FIAT 500e	12,850	\$32,112,000	8.7%	10.3%
Ford Focus Electric	2,870	\$7,154,000	1.9%	2.3%
Honda Fit EV	440	\$1,104,000	0%	0%
Kia Soul EV	860	\$2,140,000	0.6%	0.7%
Mercedes-Benz B250e	1,760	\$4,394,000	1.2%	1.4%
Mitsubishi i-MiEV	230	\$509,000	0%	0%
Nissan LEAF	28,290	\$74,733,000	19%	24%
smart Electric Fortwo	2,490	\$6,030,000	1.7%	1.9%
Tesla Model S	23,130	\$57,729,000	16%	18%
Tesla Model X	680	\$1,695,000	0.5%	0.5%
Tesla Roadster	160	\$670,000	0.1%	0.2%
Th!nk City	50	\$126,000	0.0%	0.0%
Toyota RAV4 EV	1,780	\$4,444,000	1.2%	1.4%
Volkswagen e-Golf	3,690	\$9,226,000	2.5%	2.9%
Wheego LiFe	2	\$4,000	0.0%	0.0%
<b>Plug-In Hybrid Electric Vehicles</b>	<b>59,180</b>	<b>\$88,688,080</b>	<b>40%</b>	<b>28%</b>
Audi A3 e-tron	210	\$309,000	0.1%	0.1%
Cadillac ELR	260	\$386,000	0.2%	0.1%
Chevrolet Volt	27,620	\$41,407,000	19%	13%
Ford C-MAX Energi	6,280	\$9,411,000	4.3%	3.0%
Ford Fusion Energi	8,100	\$12,142,000	5.5%	3.9%
Honda Accord Plug-In	380	\$561,000	0.3%	0.2%
Hyundai Sonata Plug-in Hybrid	130	\$192,000	0.1%	0.1%
Mercedes-Benz S-Class 550e	40	\$60,000	0.0%	0.0%
Toyota Prius Plug-in Hybrid	16,140	\$24,165,000	11%	8%
Volvo XC90 T8	40	\$54,000	0.0%	0.0%
<b>Fuel Cell Electric Vehicles</b>	<b>190</b>	<b>\$878,000</b>	<b>0.1%</b>	<b>0.3%</b>
Honda FCX Clarity	20	\$68,000	0.0%	0.0%
Hyundai Tucson Fuel Cell	80	\$380,000	0.1%	0.1%
Mercedes-Benz F-CELL	20	\$60,000	0.0%	0.0%
Toyota Mirai Fuel Cell Vehicle	70	\$370,000	0.0%	0.1%
<b>Other<sup>1</sup></b>	<b>630</b>	<b>\$1,544,000</b>	<b>0.43%</b>	<b>0.49%</b>
<b>Total</b>	<b>147,300</b>	<b>\$313,000,000<sup>2</sup></b>	<b>100%</b>	<b>100%</b>

<sup>1</sup>Includes 430 zero-emission motorcycles, 50 neighborhood electric vehicles, and 50 commercial electric vehicles.

<sup>2</sup>Does not include project administrative costs.

Figure 1 shows the statewide distribution of rebates by air district. Historically, the majority of rebates have been issued to consumers in the South Coast, Bay Area, and San Diego air districts. These urbanized areas are naturally suited to early ZEV adoption due to population density and driving patterns.

**Figure 1: Distribution of CVRP Rebates by Air District**



Growth in CVRP rebate demand, growth in number of eligible vehicles and participating manufacturers, and ZEV sales rates exceeding those required under ARB's ZEV regulation are all positive early signs for the ZEV market in California and measures of CVRP's success. However, the ZEV market is still in the early stages with deployment

totals not yet at one tenth of the Governor's goal of 1.5 million ZEVs by 2025, so continued investment in CVRP remains key in supporting ZEV market growth until the market becomes self-sustaining without incentives. Part II of this Funding Plan includes a long-term plan for CVRP and related light-duty incentives as required by SB 1275 which will help guide future evolution of CVRP.

*Outreach and Education:* Outreach and public education play a key role in helping to expand the clean vehicle market in California. The CVRP administrator, the Center for Sustainable Energy (CSE), implements a comprehensive outreach plan it developed in coordination with ARB to raise consumers' awareness of these vehicles and associated incentives with an increasing focus in disadvantaged communities. CSE focuses outreach efforts on three target audiences – new car buyers in general, new car dealers, and consumers in disadvantaged communities.

As a statewide program, CVRP is intended to support wide-spread adoption of ZEV deployment and as such, the primary target audience is new car buyers. Outreach efforts for CVRP focuses on events surrounding new car buyers which include National Drive Electric Week, Bay Area Experience Electric campaign, Earth Day fairs, and original equipment manufacturer (OEM)-sponsored test drive events. CVRP staff also coordinates with regional, state, and national plug-in electric vehicle (PEV) awareness campaigns and programs such as South Coast Air Quality Management District's (AQMD) Replace Your Ride, San Joaquin Valley Air Pollution Control District's (APCD) Drive Clean!, Drive California, and the multi-state North East States for Coordinated Air Use Management.

In addition to consumer awareness, OEM and new car dealer education is also critical in ensuring CVRP's success. Dealer education primarily focuses on providing dealers current information on the availability of consumer incentives as well as information on how to overcome adoption barriers which prevent most consumers from adopting a ZEV. To build awareness with dealers, CSE conducts quarterly, dealer specific webinars to provide information on current funding levels, eligibility, application process, and general project information. CSE also participates in OEM-specific training events and distributes OEM-specific CVRP outreach materials to dealers for new car buyers, which includes information on local incentives.

In conjunction with new car buyer and dealer education activities, CSE has launched a separate CVRP outreach effort tailored to consumers in disadvantaged communities. As part of this effort, CSE has developed community partnerships with the Charge Ahead Coalition, Strategic Growth Council, Greenlining and other community-based organizations, legislative offices, and labor unions. CSE has also developed region-specific outreach material to promote awareness of increased CVRP rebate levels and other local incentives. The CVRP website and outreach materials are now available in Spanish and will be translated into more languages in the future. These efforts are coordinated with the State's overall disadvantaged community outreach for the California Climate Investments.

ARB staff continues to seek new or expanded outreach strategies to further increase participation, and staff is proposing expanded outreach as part of the CVRP changes for FY 2016-17 as discussed further below.

**Status of FY 2015-16 Appropriation:** For FY 2015-16, ARB allocated \$75 million in Low Carbon Transportation funds to CVRP. The Budget Act of 2015 includes a restriction that agencies cannot spend more than 75 percent of their auction proceeds appropriations prior to the fourth Cap-and-Trade auction of the fiscal year. Consequently, only \$56.25 million is currently available to spend. This funding ran out on April 4, 2016, approximately one week after income eligibility limits were launched which has complicated the roll out of this new element of CVRP.

CVRP is continuing to accept applications; however, there may be delays in issuing rebates if forthcoming funding isn't available in a timely fashion. Staff anticipates the remaining \$18.75 million will be available in late May or June 2016. Rebate demand in excess of this amount will be fulfilled from the FY 2016-17 appropriation. Staff is proposing a provision below to help expedite repayment of these rebates once the FY 2016-17 State Budget is signed, so it expects all consumers will receive rebates within 90 calendar days.

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff has estimated the three year funding need for CVRP as part of its long-term plan for CVRP and related light-duty incentives. In that forecast, staff estimated CVRP demand for the remainder of the FY 2015-16 cycle (through September 2016) and the demand for the FY 2016-17 cycle (October 2016 through September 2017). These projections are shown in Figure 2, and a full discussion of the forecasting methodology is presented in Part II of this Funding Plan. Staff designs CVRP allocations so that each fiscal year's appropriation meets consumer demand from October of the fiscal year to September of the following year in order to ensure a seamless transition from one budget cycle to the next and avoid funding disruptions. This allows time to incorporate project changes directed by the Board in the annual Funding Plan and solicit for a project administrator as necessary between funding cycles.

**Figure 2: Projected CVRP Funding Demand**

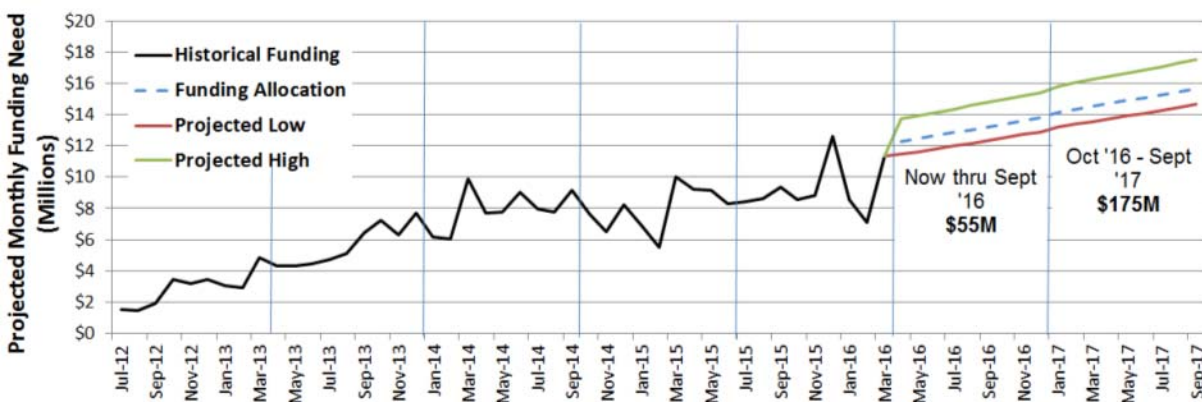


Figure 2 shows that \$55 million is needed to meet demand through September 2016 (which staff characterizes as the remaining FY 2015-16 demand), and an additional \$175 million is needed for the 12 month period starting in October 2016 (FY 2016-17 demand) for a total funding need of \$230 million. This is represented by the dashed line between the high and low projected funding need as described further in Part II. Staff proposes that the \$55 million to meet demand through September 2016 be incorporated into the FY 2015-16 CVRP grant agreement via a grant amendment. This would ensure more timely payment of rebates while ARB conducts a competitive solicitation for a grantee to administer CVRP for FY 2016-17. Staff proposes the remaining \$175 million be awarded via competitive solicitation for FY 2016-17. Staff expects a grant will be in place and this new funding would launch by October 2016.

*Outreach and Public Education Expansion:* Building on existing CVRP outreach and public education efforts, staff proposes further increasing public outreach and education efforts to improve consumer and dealer awareness including efforts in disadvantaged communities. This recommendation received strong support at the April 4, 2016 public workshop. As part of the solicitation for a CVRP administrator for FY 2016-17, ARB will require applicants to submit outreach plans that include: how they would focus outreach in disadvantaged communities including closer coordination with the light-duty vehicle pilot projects and partnering with community based organizations to help increase participation; what additional educational materials may be necessary for educating consumers about vehicles and incentives; and ideas for the development of other multimedia tools such as educational videos or mobile applications. Staff also plans to include flexibility for the CVRP administrator to use a portion of the outreach budget to participate and support local or regional, state, and/or national media campaigns to help support ZEV education and awareness efforts.

To ensure increased outreach, staff proposes to require that at least half of the administrator's allowable rebate processing fee be used to support outreach and public education. To date, there has not been a minimum outreach requirement expressed as a percent of the administrator's budget, but CSE has devoted about a third of its budget to outreach and public education in recent funding cycles.

Opportunities for increased outreach and public education may include: developing additional disadvantaged community focused outreach materials to provide information on the total cost of ownership and vehicle technology comparisons; designing a CVRP webpage to specifically for lower-income consumers; collaborating with organizations within the automotive industry (such as Edmunds, AAA affiliates, Kelley Blue Book) and outside the industry (such as air districts, local governments, and utilities) to develop cooperative marketing and outreach material; and coordinating ZEV test drives. These efforts will be coordinated with ARB's own outreach efforts, including those focused on disadvantaged communities.

*Prioritize Rebate Payment for Lower-Income Consumers:* ARB staff has proposed a CVRP allocation that it believes will meet demand through September 2017. However, there are inherent uncertainties in forecasting demand, so staff proposes to incorporate



prioritization provisions in the event funding runs out prior to the end of the fiscal year. Staff proposes to evaluate funding on a continual basis, and if needed, set aside an appropriate amount of funding to prioritize payment of rebates for lower-income consumers at the beginning of the fourth quarter of the fiscal year. Rebates would still be accepted and processed on a first-come first-served basis, but priority for payment would be given to lower-income consumers should this occur.

*Remove Neighborhood Electric Vehicles from CVRP:* Neighborhood electric vehicles have been a part of CVRP since its inception. However, no current models are available in the California market that meet the CVRP eligibility requirements, so staff proposes to remove these vehicles from the CVRP list of eligible vehicles to avoid consumer confusion. In the event that neighborhood electric vehicles meeting the enhanced warranty provisions required for CVRP-eligibility are offered for sale in California in the future, staff would revisit this decision.

*Fuel Cell Electric Vehicle Rebate Levels:* The rebate amount for fuel cell electric vehicles is currently \$5,000 and \$6,500 for qualifying lower-income consumers, and these vehicles are temporarily exempt from the income cap because these vehicles are in a much earlier stage of commercialization than BEVs or PHEVs. Staff has committed to re-evaluate these provisions annually. Through March 2016, CVRP has only issued rebates for about 165 fuel cell vehicles. Accordingly, staff believes the higher rebate level and temporary delay of the income cap for these vehicles should remain in place and proposes no changes to these provisions for FY 2016-17.

*Point-of-Sale and Pre-Qualification Mechanisms:* Staff proposes to incorporate a pre-qualification mechanism into CVRP in the FY 2016-17 cycle. However, there are still implementation details that need to be resolved before launching this change as discussed further below. Staff anticipates a spring 2017 launch.

SB 1275 requires ARB to consider converting CVRP to a point-of-sale incentive or include a pre-qualification mechanism. ARB staff has previously considered transitioning the rebate to a point-of-sale incentive, but did not recommend the change in prior fiscal years in part due to the need for stable and continuous funding to ensure such a mechanism will work effectively. Additionally, direct point-of-sale purchase incentives may provide incentives to consumers who would have purchased or leased an eligible advanced technology vehicle without the incentive, making the program less cost-effective and increasing the funding demand. Currently, only about 70 percent of BEV and PHEV purchasers are taking advantage of the rebate.<sup>15</sup>

ARB staff held multiple public workgroup meetings to discuss several long-term program considerations for CVRP, including transitioning the incentive to the point-of-sale and offering a pre-qualification mechanism. During the workgroups, staff posed several key considerations that may impact the ability to offer a purchase incentive directly at the time of purchase or may influence the effectiveness of this type of incentive:

---

<sup>15</sup>See CVRP website: <https://cleanvehiclerebate.org/eng/content/cvrp-participation-thru-2015-03>.



- *Historically, CVRP's funding source is an annual appropriation that varies from fiscal year to fiscal year. A point-of-sale incentive may be challenging to implement without a continuous appropriation.* While staff recognizes that funding uncertainty currently exists, this factor is compounded when the incentive is moved closer to the point of purchase because of the amount of time it takes to notify dealers and the public when funding is running low. Stakeholders agree that using a pre-qualification approach, in conjunction with the current rebate amounts, would be feasible with continued annual appropriations.
- *Verification and enforcement of key CVRP program requirements (e.g. income eligibility, ownership requirements, etc.) will be challenging.* Staff believes there needs to be a pre-qualification element to any point-of-sale redesign of CVRP in order to allow for verification of income-based participation requirements (both higher rebates for lower-income consumers and the income cap) prior to issuing rebates. Lack of such safeguards would encourage fraud. Stakeholders agreed that maintaining the key program requirements is important and that a pre-qualification approach would enable the project to operate in such a fashion.
- *The introduction of income eligibility requirements required by SB 1275 already adds a significant change to CVRP. Modifying the project further could add complexities, confuse consumers, and ultimately add to dealer responsibilities.* Staff believes, however, that the addition of a pre-qualification process in addition to maintaining the option to apply for a rebate will help to minimize consumer confusion about eligibility.

Stakeholders have advocated for including these mechanisms in FY 2016-17, noting that the incentive would be more powerful if available at the time of purchase, especially for lower-income consumers. Staff believes that such an incentive should be consistent for all participants to minimize consumer confusion and frustration with varied forms of project implementation. Hence, staff proposes to continue to work through implementation challenges over the next several months to better define a pre-qualification mechanism. Once a CVRP administrator for FY 2016-17 is selected, staff believes it will take about 4-6 months to implement such changes, and targets spring 2017 for implementation. Staff will hold public work group meetings after the CVRP administrator is selected to develop the more detailed implementation provisions with input from stakeholders.

*Waiting List Provision:* In past years, the CVRP waiting list provision has been an important feature for consumers and manufacturers alike because it provides a degree of funding certainty during gaps between funding cycles. Staff believes the proposed \$175 million budget will meet rebate demand for the full funding cycle, but acknowledges the uncertainties in its forecasts. Staff proposes that the Board provide the Executive Officer discretion to establish a waiting list to bridge the gap between budget years in the event that CVRP runs short of funding prior to the end of FY 2016-17.

*Increased Public Fleet Incentives:* Staff proposes to continue the pilot project that provides increased incentives for public fleets operating in and near disadvantaged communities (Public Fleet Pilot). This pilot has operated as a set-aside within CVRP since February 2015, with a proposed \$3 million allocation for FY 2016-17. This pilot is discussed further in the Light-Duty Pilot Projects to Benefit Disadvantaged Communities section of the Funding Plan.

*Disadvantaged Community Benefits:* CVRP will continue to be implemented on a first-come, first-served, statewide basis, so it is not possible to estimate in advance exactly how much funding will benefit disadvantaged communities. About 37 percent of Low Carbon Transportation funding for CVRP to date has provided benefits to disadvantaged communities, and about 6 percent of the funding has been spent in disadvantaged communities as reported in the March 2016 *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds*. To determine whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the 2015 *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies that Administer California Climate Investments*.

Staff expects that a similar percentage of future CVRP rebates will benefit these communities and perhaps the fraction will increase with the higher rebates available for lower-income consumers. As part of the reporting requirements associated with Cap-and-Trade auction proceeds funding, ARB will track where these funds are spent, so it can calculate the portion that benefits disadvantaged communities. In Table 5 (Chapter 2), staff included a conservative estimate that at least a third of the FY 2016-17 CVRP funding will benefit disadvantaged communities in order to demonstrate how ARB will meet its overall disadvantaged communities investment commitment.

*Terms and Conditions:* When CVRP was established, ARB and the project administrator developed Terms and Conditions to highlight the policies set forth by the Board in more detail for consumers, and ensure a fair, equitable, and responsible project. More specifically, the CVRP Terms and Conditions are intended to notify consumers of the core requirements of the program prior to submitting an application. Additionally, ARB and the project administrator developed an Implementation Manual to further define these rules and explain roles and responsibilities. In an effort to ensure that the Board is updated on the status of these items, staff has included a copy of the current Terms and Conditions and Implementation Manual as an Appendix C to the Funding Plan. These documents are updated periodically throughout the year to reflect project changes after the Board adopts each funding plan and as other changes are necessary to provide further clarity.

*Project Solicitation:* ARB will conduct a competitive solicitation to select one grantee to administer both CVRP and the Public Fleet Pilot. Currently, ARB solicits for a grantee every two years. ARB staff proposes extending this time frame to allow ARB to conduct a three-year solicitation. While the solicitation would encompass up to three fiscal

years, the grant agreement would initially cover one fiscal year with the option to renew for each of the following two fiscal years. The solicitation would be released after the Board approves the FY 2016-17 Funding Plan and the State Budget is signed. It would be open for at least 30 days. Staff anticipates having a grant in place for the FY 2016-17 funds by the end of September 2016.

## **OUTCOMES**

Staff expects the proposed allocation of \$230 million would fund approximately 98,000 rebates meeting expected demand from June 2016 through September 2017 and provide 3,800,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. However, recently launched income eligibility changes may affect these estimates, and staff will continue to monitor CVRP over the course of the year. After the funding is expended, ARB will report on the number of rebates issued, emission reductions achieved, and disadvantaged community benefits as part of future Annual Reports to the Legislature on California Climate Investments.

The ZEV market is continuing to grow dynamically and there is a clear need to evaluate the effectiveness of investments toward CVRP and other light-duty vehicle incentives. As discussed further in Part II of the Funding Plan, staff has developed a long-term strategy for CVRP and light-duty vehicle incentives to address SB 1275 requirements. These requirements include a forecast of the projected funding needs for CVRP and related programs for the immediate fiscal year and two subsequent fiscal years, a preliminary market and technology assessment to inform funding decisions, and an assessment of when a self-sustaining market is expected.

## Light-Duty Pilot Projects to Benefit Disadvantaged Communities

Proposed Low Carbon Transportation Allocation – \$44 million
--

Since the FY 2014-15 funding cycle, ARB has allocated Low Carbon Transportation funding to a suite of light-duty pilot projects designed to increase access to zero-emission and near zero-emission vehicles in disadvantaged communities and lower-income households and to reduce GHG, criteria pollutant, and toxic air contaminant emissions. ARB staff refers to these as “pilot projects” because they are designed to employ new clean vehicle transportation strategies on an exploratory basis in order to learn which strategies are successful and represent the best opportunities for expanding access throughout California. ARB staff seeks to both encourage new project opportunities and build on successful pilot projects to scale them up in future years for broader implementation. SB 1275 directs ARB to fund these types of disadvantaged community and lower-income consumer focused projects.<sup>16</sup>

In addition to providing increased access, these pilot projects also seek to increase the awareness and acceptance of the advanced technology vehicles in disadvantaged communities and by lower-income consumers. To do so, these pilot projects must overcome barriers other than just providing incentives to bridge the cost differences between clean and conventional vehicles in the marketplace. For example, the primary language for many potential pilot project participants may not be English. Project participants may also need information about clean vehicle technologies, including what is available, how it works, and the advantages they can offer. Availability of affordable financing, lack of experience with or access to credit and banking, and other challenges may also exist in these neighborhoods.

For some projects, a multilingual, person-to person approach may best serve residents’ needs and may need to include financial counseling and training on vehicle use. Partnerships with community-based organizations to help design or implement projects may be appropriate and can be very effective with outreach to disadvantaged communities and lower-income consumers. These types of focused, targeted strategies require higher administration costs in pilot projects as compared to other ARB incentive projects, at least initially, but staff believes they are necessary to truly benefit the disadvantaged communities and lower-income consumers they aim to serve in the longer term.

Table 8 shows the pilot projects funded with Low Carbon Transportation appropriations to date along with staff’s proposed project allocations for the FY 2016-17 funding cycle. ARB allocated \$9 million to these projects in FY 2014-15 and had intended to increase

---

<sup>16</sup>SB 1275 (De León, Chapter 530, Statutes of 2014). See Health and Safety Code Section 44258.4(c)(4) for direction to establish these types of projects: [http://www.leginfo.ca.gov/pub/13-14/bill/sen/sb\\_1251-1300/sb\\_1275\\_bill\\_20140921\\_chaptered.pdf](http://www.leginfo.ca.gov/pub/13-14/bill/sen/sb_1251-1300/sb_1275_bill_20140921_chaptered.pdf)

funding fourfold to \$37 million as outlined in the Board-approved FY 2015-16 Funding Plan. However, with a smaller than anticipated budget appropriation, ARB was only allocated \$10 million to this category as shown in Table 8.

**Table 8: Light-Duty Pilot Projects to Benefit Disadvantaged Communities**

<b>Pilot Projects</b>	<b>FY 2014-15 Allocation (millions)</b>	<b>FY 2015-16 Allocation (millions)</b>	<b>Recommended FY 2016-17 Allocation (millions)</b>
EFMP Plus-up	\$2	\$10	\$30
Car Sharing and Mobility Options <sup>1</sup>	\$3.1	-	\$8
Increased Public Fleet Incentives for CVRP-Eligible Vehicles	\$3	-	\$3
Agricultural Worker Vanpools in San Joaquin Valley ( <i>new for FY 2016-17</i> )			\$3
Financing Assistance for Lower-Income Consumers <sup>1,2</sup> ( <i>expand statewide for FY 2016-17</i> )	\$0.9	-	\$6 (not included in total) <sup>2</sup>
<b>Total</b>	<b>\$9</b>	<b>\$10</b>	<b>\$44</b>

<sup>1</sup>The FY 2014-15 Funding Plan allocated \$2.5 million for car sharing and \$1.5 million for financing assistance. Because the car sharing solicitation was over-subscribed and the financing assistance was under-subscribed, ARB reallocated funding between the two pilot projects consistent with the contingency provisions in the FY 2014-15 Funding Plan.

<sup>2</sup>Financing Assistance is not included in the total for this table because ARB staff proposes expanding the project statewide for FY 2016-17 as discussed later in the Funding Plan.

For FY 2016-17, ARB staff proposes allocating \$44 million to Light-Duty Pilot Projects to Benefit Disadvantaged Communities to build upon and increase prior years' investments. In addition, staff proposes that Financing Assistance, one of the previously established pilot projects, receive an increased allocation of \$6 million and the project be expanded to allow participation for lower-income consumers statewide in addition to those in or near disadvantaged communities. To reflect this expansion, staff has moved this project into a separate category, Financing Assistance for Lower-Income Consumers, which is discussed in the next section of the Funding Plan.

Many of these pilot projects have recently launched in 2015 or in early 2016, or are still in developmental stages, making it a challenge to estimate funding needs. Staff based its proposal for funding this year on experience with previous project solicitations through these beginning stages as well as stakeholder input.

Stakeholders have consistently maintained that all of these projects serve an important equity function for disadvantaged communities due to the health, economic, and social benefits they offer and that ARB should provide increased funding support. Stakeholders also suggest that ARB should increase coordination with CVRP and similar programs administered by other State agencies, including the Energy Commission, Strategic Growth Council, and California Department of Transportation (Caltrans). ARB staff meets routinely with these and other State, federal, and local agencies, and will continue to explore ways to coordinate investments of public funding.

Stakeholders have pointed out the need for effective, coordinated outreach and education to the disadvantaged communities that these pilot projects aim to benefit. They also urge coordination between pilot projects and coordination with other State and local projects serving these disadvantaged communities. ARB staff agrees, seeing outreach and education as key components of project development, design, and implementation, especially so that projects meet community needs and circumstances. Towards those ends, ARB staff has placed a priority on working to align and link pilot projects with other State and local assistance so that consumers who participate in one program are made aware and can be offered other opportunities, such as easily combining Financing Assistance with EFMP Plus-up and/or CVRP.

The remainder of this section provides an overview of each of the four light-duty vehicle pilot projects, their current project status, staff proposals for funding levels, proposed project design changes, and projected outcomes for each pilot project. As previously mentioned, the Financing Assistance for Lower-Income Consumers is discussed in more detail in the following section.

## EFMP Plus-up

Proposed Low Carbon Transportation Allocation – \$30 million
--

### **PROJECT OVERVIEW**

The goal of the EFMP Plus-up pilot project is to support advanced technology vehicle replacements for lower-income consumers living in or near disadvantaged communities by augmenting EFMP incentives to partially offset the higher costs of these advanced technologies. EFMP is a vehicle retirement (scrap) and replacement program authorized by AB 118 (Nunez, Chapter 750, Statutes of 2007) that is funded by a surcharge on motor vehicle registrations. EFMP has two components: retirement-only and retire-and-replace. The retirement-only component is run by the Bureau of Automotive Repair following guidelines set by ARB. It provides compensation to lower-income vehicle owners to retire their older, high polluting vehicles. The retire-and-replace component provides higher incentives to lower-income vehicle owners who retire vehicles and purchase replacement vehicle that meets certain fuel economy requirements. The retire-and-replace component of EFMP is administered by the San Joaquin Valley APCD and the South Coast AQMD in partnership with ARB. It has a tiered incentive structure, with the highest amounts allotted to the lowest income participants and the cleanest replacement vehicles.

ARB is using Low Carbon Transportation funding for EFMP Plus-up to focus the retire-and-replace component on benefiting disadvantaged communities in addition to and complementing the lower-income consumer focus of EFMP. Under EFMP Plus-up, lower-income vehicle owners living in or near disadvantaged communities in the South Coast or San Joaquin Valley regions get increased funding if they purchase a new or used hybrid, plug-in hybrid, or zero-emission vehicle. For example, a qualifying participant who wants to purchase a plug-in hybrid electric or battery electric replacement vehicle would receive \$4,500 from EFMP and an additional \$5,000 from EFMP Plus-up, for a total incentive of \$9,500. When coupled with a CVRP rebate, an eligible consumer purchasing a new battery electric vehicle could receive as much as \$13,500.

### **CURRENT PROJECT STATUS**

Over the last two budget cycles, ARB awarded \$12 million in funding for EFMP Plus-up to the San Joaquin Valley APCD and South Coast AQMD (\$6 million to each air district). As a requirement of these grant agreements, participants must have incomes less than 400 percent of the federal poverty level and live in ZIP codes containing disadvantaged community census tracts. Through January 1, 2016, nearly 95 percent of all recipients have annual incomes below 225 percent of the federal poverty level.

As of January 1, 2016, the San Joaquin Valley APCD has spent about \$1.3 million of its EFMP Plus-up funds to replace 217 vehicles. About 17 percent are battery electric

vehicles, 23 percent are plug-in hybrid electric vehicles, and 60 percent are hybrids. Public events are held bi-weekly throughout the San Joaquin Valley where participants can have their older vehicles assessed for retirement and begin shopping for a cleaner replacement. Based on projections of current information, this funding may be fully expended in 2016 and result in about 700 vehicles being replaced. More information is available at: [www.valleycan.org/tune\\_in\\_tune\\_up.php.html](http://www.valleycan.org/tune_in_tune_up.php.html).

The South Coast AQMD has spent about \$1.3 million in EFMP Plus-up funding through the end of 2015, replacing 222 vehicles. About 23 percent are battery electric vehicles, 25 percent are plug-in hybrid electric vehicles, and 52 percent are hybrids. Based on projections of current information, this funding may be fully expended in 2016 and result in about 700 vehicles being replaced. Interested participants can apply to the program online or through a bilingual dedicated call center. More information is available at: [www.replaceyourride.com](http://www.replaceyourride.com).

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes a \$30 million allocation for FY 2016-17. \$20 million would be allocated to the San Joaquin Valley APCD and South Coast AQMD (\$10 million to each air district) to support the anticipated growth of these two existing programs. ARB staff estimates this funding level would contribute to replacing up to 1,400 vehicles in each air district, which would bring significant emission reductions and health benefits to disadvantaged communities in both air districts.

\$10 million would be allocated to expand EFMP Plus-up to other air districts that implement a vehicle retirement and replacement program that meets minimum requirements established in the EFMP Guidelines and additional requirements included in EFMP Plus-up grant agreements. The Bay Area, Sacramento, and Santa Barbara air districts have expressed interest in starting EFMP Plus-up programs in their regions. As with the San Joaquin Valley and South Coast EFMP Plus-up programs, Low Carbon Transportation funding would be limited to advanced technology vehicle replacements that benefit disadvantaged communities. ARB staff proposes maintaining the FY 2015-16 project parameters with no significant changes.

Looking more broadly at the emphasis on incentive programs in ARB's *Mobile Source Strategy* and recognizing the upward trajectory of the existing programs as well as the expected expansion of EFMP Plus-up to additional districts eager to implement their own programs, ARB staff projects a sharply increasing funding need of up to \$150 million over the next three years, with up to \$50 million in FY 2017-18 and up to \$70 million in FY 2018-19. ARB recognizes that this funding projection requires each district's program to grow in scale considerably in a three-year period and may experience challenges associated with growing their programs so quickly. As such, staff will be closely monitoring and assessing each district's ability to achieve the growth necessary to meet the funding targets. In addition, future funding needs and the amount available to each district will depend on how many new districts adopt EFMP Plus-Up in the coming years.



*Grant Award Process:* ARB would award EFMP Plus-up funding non-competitively through grant agreements with the San Joaquin Valley APCD, South Coast AQMD, and other air districts that choose to start an EFMP Plus-up program. This project will continue to require outreach, education, and consumer protections for lower-income consumer recipients living in or near disadvantaged communities.

*Flexibility to Redirect Unused Funds:* Uncertainties exist regarding how quickly current EFMP Plus-up programs in the San Joaquin Valley and South Coast regions will expend funds, how many new air districts will request funds to start new programs, when those new air districts will start their programs, and how quickly these new programs will ramp up. Stakeholders have requested that ARB incorporate flexibility provisions that would ensure sufficient funds are available to support the expansion of EFMP Plus-up to air districts that choose to start a qualifying program, but would also provide ARB the ability to redirect funds as the funding cycle progresses in the event that a portion of the \$10 million allocated for new district programs is unused.

ARB staff agrees that flexibility provisions should be included to ensure funds are directed where they will be utilized most effectively. Accordingly, staff proposes a flexible award schedule that will reserve the \$10 million portion for EFMP Plus-up for new air district programs for at least the first 6 months of FY 2016-17. This will provide air districts that are contemplating developing new programs the assurance of funding availability while they formulate their EFMP plans in collaboration with ARB. At that point, ARB staff will evaluate the interest expressed and the funding needs proposed for new air district programs, as well as the demand being experienced by the existing San Joaquin Valley and South Coast programs. ARB staff will work with the air districts in determining whether funding should be shifted from the new program allocation to existing programs that show demand. If there is not initial demand for the full \$10 million proposed for new air district programs, ARB staff proposes that a minimum amount of approximately \$5 million remain available for potential new air district programs through the end of FY 2016-17.

## **OUTCOMES**

Staff estimates the proposed FY 2016-17 allocation for the existing programs in the South Coast and San Joaquin Valley will support replacing approximately 1,000 to 1,400 vehicles in each air district. In addition, ARB staff expects that the remaining funds will support the establishment of new programs in two or three air districts. Depending on how quickly the new programs are developed and administered, ARB staff expects at least 300 cars per air district could be replaced through FY 2016-17. Staff estimates the proposed \$30 million allocation for EFMP Plus-up would achieve around 25,000 metric tons of CO<sub>2</sub> equivalent GHG reductions.

ARB staff's analysis shows that the vast majority of the on-road fleet must be zero- and near zero-emission vehicles by 2050 to meet the State's GHG targets. ARB's *Mobile Source Strategy* indicates that incentive programs such as EFMP and EFMP Plus-up

will be essential in facilitating the light-duty fleet transition to zero-emission and near zero-emission technologies, and calls for further deployment of cleaner light-duty vehicle technology through the expansion and enhancement of retire-and-replace incentive projects to accelerate the turnover of the fleet to meet an overall LEV III or better emissions level. The increase in funding over the next three years proposed above will play an important part in meeting these demands.

Air districts that are participating in EFMP Plus-up must report project information on a quarterly basis based on project administration and consumer surveys. With this information, and through continued interaction with stakeholders and analysis of the state of the light-duty vehicle market, ARB will be able to determine the participation rate and advancement of clean vehicles for disadvantaged communities and lower-income consumers, assess future funding needs, and evaluate other opportunities for making program enhancements.

# Car Sharing and Mobility Options

Proposed Low Carbon Transportation Allocation – \$8 million
---

## **PROJECT OVERVIEW**

The Car Sharing and Mobility Options pilot project is designed to help individuals in disadvantaged communities benefit from the use of a zero-emission or near zero-emission vehicle without the responsibility of car ownership costs, and to offer alternate modes of clean transportation that encourage the shared use of zero-emission and near zero-emission transit, vanpools, and other mobility options. This project provides GHG, criteria pollutant, and toxic air contaminant emission reductions and will be used to gather data to help support larger scale advanced technology car share programs in the future. This pilot project also supports SB 1275 requirements to fund disadvantaged community focused programs such as car sharing pilot projects and support for the installation of electric vehicle charging infrastructure, including installations in multiunit dwellings in disadvantaged communities.

## **CURRENT PROJECT STATUS**

In FY 2014-15, a competitive solicitation process with \$2.5 million in available funding resulted in 13 applications requesting more than \$16 million for car sharing projects targeting disadvantaged communities throughout California. A transfer of approximately \$600,000 from the Financing Assistance pilot project resulted in total available funding of nearly \$3.1 million, which ARB awarded to:

- City of Los Angeles (\$1.7 million in Low Carbon Transportation funds, with over \$6 million in match funding) to start a new car share service in Los Angeles with 100 advanced technology vehicles and installation of over 100 chargers. It will serve up to 7,000 residents of Westlake, Pico-Union, neighborhoods north of the University of Southern California, and portions of the Downtown, Hollywood, and Koreatown disadvantaged communities currently unserved by car sharing.
- Sacramento Metropolitan Air Quality Management District (\$1.4 million in Low Carbon Transportation funds with almost in \$500,000 match funding) to start a new car share service for up to 2,000 residents at three disadvantaged community multiunit subsidized housing projects in Sacramento. This scalable project will provide an eight-vehicle all-electric fleet with chargers installed at the housing locations and a DC fast charger at a light-rail intermodal passenger hub.
- SANDAG (\$300,000 in Low Carbon Transportation funds with approximately \$100,000 in match funding) to expand an existing zero-emission car share service to serve the Barrio Logan and Logan Heights neighborhood disadvantaged communities. This project was terminated in April 2016 because the car sharing company that SANDAG partnered with decided to no longer offer

zero-emission vehicles as part of their car sharing operations, leaving an unused balance of approximately \$290,000. Subsequently, ARB reallocated \$265,000 of the unused balance to fully fund the Sacramento Metropolitan AQMD car share project, with the remainder \$25,000 available for future awards.

These Car Sharing and Mobility Options pilot projects feature strong support from local and regional government agencies, private sector operators, and community-based organizations that together will help to ensure that the health, economic, and social benefits of advanced technology car sharing reach disadvantaged neighborhoods. Plans for these projects include extensive targeted bilingual outreach and education, mechanisms to include residents who do not have bank accounts, and installation of charging infrastructure to serve multiunit housing in disadvantaged communities. Initial project launches for both the City of Los Angeles and the Sacramento Metropolitan AQMD projects are anticipated in summer 2016.

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes an \$8 million allocation for FY 2016-17 for Car Sharing and Mobility Options. This includes \$6 million to be awarded through a competitive solicitation process. \$2 million would be reserved to expand existing projects based on an evaluation of the existing projects' success in meeting their project goals with a requirement that grantees provide additional match funding. ARB staff proposes flexibility to adjust these allocations to maximize the overall use of funding pending the outcome of the competitive scoring process for new project applications and evaluation by ARB staff of any specific proposals for the possible expansion of existing projects.

ARB staff proposes the following changes, with solicitation details to be developed through a public work group process:

- Add electric bike sharing as an eligible first-mile/last-mile mobility options component of a car sharing project, including eligibility for the purchase of electric bicycles and bike-share infrastructure.
- Introduce a goal for regional balance of awarded projects, subject to availability, within the group of the highest ranked proposed projects received.
- Include in the project solicitation an increased focus on outreach and public education as an element of the car share projects to be funded.

### **OUTCOMES**

ARB will begin to collect data and estimate emission reductions once the initial pilot projects launch to disadvantaged community residents beginning in summer 2016. Grantees will provide pre-project information on participant uses of transportation and their unmet transportation needs, and once the projects are running, they will provide information on usage of the car sharing system. ARB staff will evaluate these data and

determine where opportunities exist to expand successful programs. ARB staff will report in the annual reports to the Legislature and future Funding Plans the progress that has been made, emissions reduced, and the co-benefits that car sharing pilot projects bring to disadvantaged communities.

ARB staff sees great promise for car sharing projects to grow and expand to more regions of California. ARB staff proposes \$8 million of funding for this project in FY 2016-17, with \$6 million for new projects and \$2 million for expansion of existing projects. This proposal is a large increase from the \$2.5 million in FY 2014-15 for car sharing pilot projects, but is based on the strong solicitation response that saw project proposals requesting over \$16 million, over 6 times the available funding. If more funds had been available, staff would have recommended selecting another \$5 million of the top-ranked projects for funding. Accordingly, ARB staff proposed \$5 million for car sharing pilot projects in the FY 2015-16 Funding Plan, but that funding was ultimately not allocated.

Going forward, stakeholders have identified opportunities for adding as many as 40 to 50 additional car sharing projects to serve disadvantaged communities over the next three years. Based on the average project proposal from the FY 2014-15 solicitation, this would translate to a projected funding need of up to \$25 million in FY 2017-18 and up to \$30 million in FY 2018-19.

In Appendix A, staff has provided an illustration of emission reductions that could result from a car sharing pilot project scenario. As these projects begin to be implemented and usage information is collected, ARB staff will have a better basis to calculate the associated emission reductions.

## Increased Public Fleet Incentives for CVRP-Eligible Vehicles

Proposed Low Carbon Transportation Allocation – \$3 million
---

### **PROJECT OVERVIEW**

The Public Fleet Pilot Project offers higher rebates for public fleets operating in and near disadvantaged communities for the purchase of CVRP-eligible vehicles. The goal for this pilot project is to deliver the emission reductions and associated health benefits that clean vehicles can offer by helping transform the public fleets that operate in disadvantaged communities. These communities and residents will also gain awareness and experience with the vehicles and technologies they employ.

Higher rebate amounts are needed for these fleets to help purchase more expensive clean vehicles, especially because public fleets are not eligible to receive the federal tax credit for clean vehicle purchases. Further, this project allows public fleet operators to place clean vehicles into their long-term fleet purchasing plans and budgets by allowing incentives funds to be reserved well before actual purchases take place. Accordingly, the incentive amounts offered are \$5,250 for a plug-in hybrid vehicle, \$10,000 for a battery electric vehicle, and \$15,000 for a fuel cell electric vehicle. This pilot project is operated as a set aside within CVRP.

### **CURRENT PROJECT STATUS**

ARB awarded a FY 2014-15 grant of \$2.9 million to CSE to administer the Public Fleet Pilot Project within CVRP. The pilot project launched in February 2015. To date, about \$2.5 million of the available funding has been reserved by or issued to public fleets to purchase approximately 400 vehicles. More information is available on the project web site at: <https://cleanvehiclerebate.org/eng/pfp>. ARB staff estimates that the remaining available funding will run out in June or July 2016.

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes a \$3 million allocation for FY 2016-17. This project will continue to be administered as a set-aside within CVRP and will continue to require that the public fleet must operate in and near disadvantaged communities to be eligible. Staff is proposing no changes to project requirements for the FY 2016-17 funding cycle. For future funding cycles, ARB staff will transition this pilot project to become a standard part of CVRP. As public fleets achieve higher adoption rates of advanced technology vehicles, ARB staff will evaluate the continuing needs for these incentives, including consideration of reductions of rebate amounts for public fleets.

Terms and Conditions: ARB and the project administrator have developed Terms and Conditions to highlight the policies set forth by the Board in more detail for public fleet managers contemplating applying to participate in the project. These ensure a fair,

equitable, and responsible project. More specifically, the Terms and Conditions are intended to notify public fleet managers of the core requirements of the program prior to submitting an application. Additionally, ARB and the project administrator developed an Implementation Manual to further define these rules and explain roles and responsibilities. In an effort to ensure that the Board is updated on the status of these items, staff has included a copy of the current Terms and Conditions and Implementation Manual as Appendix D to the Funding Plan. These documents are updated periodically throughout the year to reflect project changes after the Board adopts each funding plan and as other changes are necessary to provide further clarity.

*Project Solicitation:* As noted previously in the CVRP section, ARB will conduct a competitive solicitation to select one grantee to administer both CVRP and the Public Fleet Pilot with the details provided in the CVRP section.

## **OUTCOMES**

Public fleet vehicles that operate in and near disadvantaged communities present a unique opportunity for introducing zero- and near zero-emission vehicles directly to these communities. In addition to the health and other co-benefits these clean vehicles provide, residents will gain increased knowledge and experience with these vehicles and the technologies they employ as they operate in and around these communities. In addition, the clean vehicle purchases that these incentives will make possible will help State fleets achieve the Governor's goal of purchasing 25 percent zero-emission vehicles as part of their overall light-duty vehicle purchases.

The continuing need for public fleet incentives exists because local and state government fleets face cost and other barriers when adopting clean vehicles. Over the longer-term, staff envisions integrating the Public Fleet Pilot Project into CVRP, most likely as a set-aside of dedicated funding available to address the often lengthy procurement process for public fleets. Staff expects the proposed FY 2016-17 allocation of \$3 million would fund approximately 400 vehicle rebates. This number of rebates would meet the demand expected by ARB staff and provide about 13,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions over the life of project.

# **Agricultural Worker Vanpools in the San Joaquin Valley**

Proposed Low Carbon Transportation Allocation – \$3 million
---

## **PROJECT OVERVIEW**

The Agricultural Worker Vanpools in the San Joaquin Valley pilot project would provide expanded access to clean transportation vanpools for agricultural workers in the San Joaquin Valley’s disadvantaged communities. Eligible vehicles will include zero-emission, plug-in hybrid, or hybrid passenger vans, with preferences for new, HVIP-eligible vehicles. Vehicle conversions and installation of electric vehicle supply equipment for appropriate multiunit dwellings and other appropriate locations may also be considered for funding. This pilot project would provide much needed GHG emission reductions in the San Joaquin Valley and would support SB 1275 requirements for ARB to increase access for lower-income consumers to clean transportation and to fund installation of charging infrastructure at multiunit dwellings in disadvantaged communities.

The Strategic Growth Council awarded \$3 million of FY 2014-15 Affordable Housing and Sustainable Communities Program funding for an agricultural worker vanpool expansion project. ARB staff will coordinate with the Strategic Growth Council regarding the outcomes of that project and will apply any relevant lessons learned as it develops and implements ARB’s proposed pilot.

The Board-approved FY 2015-16 Funding Plan included \$3 million for this pilot project. However, with a smaller than anticipated budget appropriation, this project was not funded. ARB staff concurs with continued stakeholder input that this pilot project is needed for the health, economic, and social benefits it offers for agricultural workers in San Joaquin Valley disadvantaged communities.

## **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes an allocation of \$3 million for FY 2016-17, the same funding amount ARB planned to direct to this project in FY 2015-16. ARB staff will use a public work group process to develop project parameters, including development of vehicle eligibility criteria. Funding may be awarded either non-competitively through a grant agreement with a public entity or through a competitive solicitation process.

## **OUTCOMES**

ARB staff cannot estimate specific outcomes of a pilot project until a project is selected for funding. ARB staff will report in Annual Reports and future Funding Plans the outcomes of this project as it begins serving agricultural workers and disadvantaged communities in the San Joaquin Valley. Based on input from stakeholders regarding the number of cleaner vanpools needed to serve the agricultural worker population,



ARB staff projects a continuing funding need for this pilot project of \$3 million in FY 2017-18 and \$3 million in FY 2018-19.

In Appendix A, staff has provided an illustration of emission reductions that could result from an agricultural worker vanpool pilot project scenario. When this project begins to be implemented and usage information is collected, ARB staff will have a better basis to calculate the associated emission reductions.

## **Financing Assistance for Lower-Income Consumers**

Proposed Low Carbon Transportation Allocation – \$6 million
---

### **PROJECT OVERVIEW**

Vehicle financing can be a significant barrier to vehicle ownership for many lower-income consumers, especially for the purchase or lease of more expensive, zero-emission and near zero-emission vehicles. The goals for this pilot project are to help improve access to affordable financing mechanisms for lower-income consumers to purchase or lease cleaner vehicles, and to provide additional health, economic, and social benefits to their communities. This project also supports SB 1275 requirements for ARB to promote financing mechanisms to increase access to clean vehicles for lower-income consumers, which are defined for this project as individuals with incomes of less than 400 percent of the federal poverty level.

To meet these goals, the project includes helping participants with financial literacy and education on clean vehicles, so they have the knowledge necessary to have a successful loan experience and to understand how to operate and maintain these clean vehicles and the advanced technologies they use. Staff anticipates that many if not most vehicles acquired through this program will be used vehicles; eligible vehicles include new or used hybrid, plug-in electric hybrid, or zero-emission vehicles, and must be 8 years old or newer with a combined fuel economy rating of at least 20 miles per gallon of fuel or more depending on the model year. Project design includes additional consumer protections, such as ensuring that the vehicles do not have any outstanding safety recalls, so that the participant experience is satisfactory and results in a larger positive impression about clean vehicles in lower-income communities.

The project funds a variety of financing mechanisms that a grantee can offer, including loan loss guarantees, interest rate buy-downs, vehicle price buy-downs, and support for installation of charging equipment for battery electric vehicles acquired through the program. These financing assistance approaches can be combined with CVRP and EFMP Plus-up funding opportunities to help make these other programs more accessible to lower-income Californians. ARB staff understands that because there is not much information currently available regarding the types of financing mechanisms that will actually help lower-income consumers obtain cleaner vehicles, there may be the need to make adjustments to project design as more information is gathered.

### **CURRENT PROJECT STATUS**

In November 2015, ARB awarded a FY 2014-15 grant of about \$900,000 to the Community Housing Development Corporation (CHDC) to administer a Financing Assistance pilot project to benefit disadvantaged communities and lower-income consumers in the Bay Area. The pilot project combines a loan loss reserve program with vehicle price buy-down assistance. Prospective recipients are identified through

the CHDC's housing assistance program and offered additional financial and vehicle technology familiarization training prior to receiving a vehicle loan. CHDC evaluates each client's commitment to the program and their credit, employment, and residence history. A loan committee made up of banks and community organizations decide on the client's ability to repay the loan. Once the loan is made, CHDC counselors remain in contact with the recipient throughout the term of the loan to help ensure optimal loan and vehicle usage outcomes. The project performance goals are to provide 100 loans for clean vehicles over the next 3 years. CHDC is targeting automotive lending projects up to \$8,000 per loan at an interest rate of 8 percent or below, with a maximum loan term of 36 months.

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes a \$6 million overall allocation for FY 2016-17 with two complementary elements, \$5 million for a statewide project and \$1 million for local projects, as described below:

- *Statewide Project:* The \$5 million statewide project would be open to lower-income consumers throughout California. This project would be designed to coordinate with the EFMP Plus-up programs and CVRP to ensure that lower-income consumers throughout the State have increased access to advanced technology vehicles. By coordinating closely with EFMP Plus-up, which will continue to focus on benefiting consumers living in and near disadvantaged communities, ARB will ensure much of this funding still benefits these communities.

ARB staff proposes that this statewide project could be awarded through either a competitive solicitation process or via an interagency agreement with the State Treasurer's Office California Pollution Control Financing Authority (CPCFA). Based on ARB's experience with CPCFA as the administrator of the Truck Loan Assistance Program since 2009, ARB staff believes CPCFA is highly qualified to administer the statewide element of the Financing Assistance for Lower-Income Consumers pilot project. A bill currently pending before the Legislature would provide CPCFA the statutory authority it needs to administer this project.

- *Local Projects:* Staff proposes that \$1 million be made available for local projects to be awarded via a competitive solicitation as did the FY 2014-15 Financing Assistance pilot project, with the exception that this \$1 million element would also be available for lower-income consumers throughout California. Based on discussions with local community and non-profit organizations, there may be additional opportunities for one or more local programs that can help lower-income consumers purchase advanced technology vehicles, similar to the model that CHDC is currently administering in the Bay Area. Funding these types of programs could help lower-income consumers who may not be able to participate in a statewide financing project or require other avenues of assistance such as through job development or community housing organizations. Last,

staff proposes that these funds be available for the potential expansion of the existing project as well as for new projects.

If a statewide or a local financing project is undersubscribed, staff proposes allowing contingency provisions to shift funding between the statewide and local projects based on demand.

*Proposed Changes to Financing Assistance Project Criteria:* In February 2016, ARB staff began a public work group process to present potential project criteria changes to the FY 2016-17 Financing Assistance for Lower-Income Consumers pilot project. These changes are based on early experience with the FY 2014-15 pilot project, and are designed to better fit the needs of lower-income consumers. These potential changes include the following:

- Increasing assistance to lower-income consumers, such as by adjusting the vehicle price buy-down amount and lowering the interest rate cap.
- Offering more consumer protections, such as by modifying the used vehicle criteria.
- Increasing the integrity of the project, such as by extending the minimum ownership requirement.

Stakeholder feedback on these potential changes was generally positive but indicated that further evaluation and input is needed. ARB staff agrees and will continue the work group process to develop these potential changes to criteria for this project, pending the outcome of Board consideration of this Funding Plan.

*Disadvantaged Community Benefits:* This proposed funding would be available statewide, so it is not possible to estimate in advance exactly how much funding will benefit disadvantaged communities. However, staff expects that much of this funding still benefit these communities because the project would be closely coordinated with EFMP Plus-up which will continue to focus on benefiting consumers living in and near disadvantaged communities. Staff conservatively estimates that at least half this funding would benefit disadvantaged communities. As part of the reporting requirements associated with Cap-and-Trade auction proceeds funding, ARB will track where these funds are spent, so it can calculate the portion that benefits disadvantaged communities. To determine whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the 2015 *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies that Administer California Climate Investments*.

## **OUTCOMES**

ARB will use project data from the current CHDC project as it becomes available to better understand the costs, types, and issues associated with vehicles purchased or

leased, how well the needs of consumers that participate are met, how well the financing mechanisms work, and future opportunities to continue or even expand this project. This pilot project will also help identify if this a successful model that can be adopted by other local community housing corporations or non-profit organizations that have a focus on promoting car ownership for lower-income consumers. The progress that is made by the CHDC project, the emissions it reduces, and the co-benefits it delivers to Bay Area disadvantaged communities will be reported in annual reports to the Legislature and in future Funding Plans.

For FY 2016-17, the goal is to develop a \$5 million statewide program and allocate \$1 million for local financing assistance programs. For the statewide project, staff proposes a program that includes a loan loss reserve model that is designed to minimize lender risk for loans made to lower-income consumers, in combination with a vehicle price buy-down to assist consumers by making a clean vehicle purchases more affordable.

The statewide program proposal is based on the success of the EFMP Plus-up pilot project and stakeholder feedback urging ARB to expand the menu of assistance for lower-income consumers to access clean transportation. ARB staff anticipates that developing successful financing assistance pilot projects, especially on a statewide level, can create substantial demand for lower-income consumers to obtain clean vehicles that can be more expensive, especially zero-emission and near zero-emission vehicles. Also based on the experience from the Truck Loan Assistance Program, staff anticipates that as the loans are paid off, funds in the loan loss reserve can be used to leverage additional loans.

For FY 2016-17, based on feedback from CPCFA, ARB staff believes that \$5 million could provide the financial resources necessary to create a new statewide project with a goal to fund up to 500 consumer loans. If the statewide project is successful at the initial funding level, staff believes that the demand in future years for the statewide project could increase substantially. To meet that potential demand, and to signal to potential grantees a longer term intent, staff has identified a potential funding need of \$30 million to \$50 million for FY 2017-18, enough to fund about 2,500 loans, and \$40 million to \$70 million in FY 2018-19, enough to fund about 5,000 loans. These projected funding amounts and goals for loans funded also include allocations for local programs in both fiscal years. For local projects, staff estimates the funding need could be \$1 million to \$3 million each year in order to fund 100 to 300 consumer loans.

Acknowledging that current data is limited on financing mechanisms targeting lower-income consumers, ARB staff sees the need for flexibility in funding allocations between the statewide and local programs and project design as new information is obtained and financial models are developed and administered. ARB staff believes this project has great potential for helping transform the fleet of vehicles operated by lower-income Californians, but acknowledges that project design needs careful and continued evaluation as knowledge is gained from the existing pilot project and feedback is provided by stakeholder through the public work group process.

## **CHAPTER 4: HEAVY-DUTY VEHICLE AND OFF-ROAD EQUIPMENT INVESTMENTS (SB 1204 and AQIP)**

---

Achieving California's critical air quality and climate change goals requires a transformation of the on-road and off-road fleet to one that utilizes zero- and near zero-emission technologies operating with the cleanest, lowest carbon fuels. ARB staff's proposed investments for heavy-duty vehicles and off-road equipment are intended to support this transformation by demonstrating emerging technologies, advancing commercial viability through pilot and other deployment projects, and catalyzing further technological development by the private sector.

Because of the smaller than anticipated FY 2015-16 Low Carbon Transportation budget appropriation, only \$5 million of the \$148 million for heavy-duty vehicle and off-road equipment Low Carbon Transportation investments identified in the FY 2015-16 Funding Plan was allocated to projects. ARB staff proposes that the unfunded projects be carried forward to FY 2016-17, with adjustments made based on information learned over the last year as explained in the project descriptions in this chapter.

### **Policy and Statutory Drivers**

ARB's *Mobile Source Strategy, First Update to the Climate Change Scoping Plan*, 2012 *Vision for Clean Air*,<sup>17</sup> and the *California Sustainable Freight Action Plan*, May 2016 draft, all emphasize the need for zero- and near zero-emission strategies to meet long-term GHG emission targets, federal health-based ozone standards, and petroleum use reduction goals. These plans identify near-term measures and actions to promote cleaner combustion in trucks, marine vessels, and off-road equipment as well as accelerated penetration of zero-emission trucks, buses, and equipment where the technologies are ready for the commercial market.

### **COMPLEMENTARY HEAVY-DUTY INVESTMENT PORTFOLIO**

Development of advanced heavy-duty technologies requires a portfolio of incentives that provide funding for the range of technologies needed to achieve both near-term and long-term emission reductions. Where zero-emission technologies are not yet commercialized or have not yet reached the market penetration needed for deep near-term emission reductions, near zero-emission technologies can help meet critical emission reduction goals. For example, incentives for low NO<sub>x</sub> engines using renewable fuels, a project included in this chapter, can reduce criteria pollutant and GHG emissions while also supporting the goals of the Low Carbon Fuel Standard (LCFS) and complementing the Energy Commission's biofuel production incentives and the Very Low Carbon Fuels Incentive Project described in the next chapter.

---

<sup>17</sup> *Vision for Clean Air: A Framework for Air Quality and Climate Planning*, June 2012.  
<http://www.arb.ca.gov/planning/vision/vision.htm>

## **SB 1204 REQUIREMENTS AND GOALS**

Guiding the investments proposed in this chapter are the requirements and goals of SB 1204 (Lara, Chapter 524, Statutes of 2014). SB 1204 created the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program in Health and Safety Code Section 39719.2 to fund the development, demonstration, pre-commercial pilot, and early commercial deployment of zero- and near zero-emission technologies with priority given to projects that benefit disadvantaged communities. This program, funded with auction proceeds appropriated to ARB, builds on AQIP and Low Carbon Transportation investments from prior funding cycles.

The FY 2015-16 Funding Plan described both the requirements of SB 1204 and how ARB would meet these requirements for the projects to be funded. As discussed earlier, most of the projects in the FY 2015-16 Funding Plan did not receive funding; however, the established framework continues to guide heavy-duty vehicle and off-road equipment investments for FY 2016-17. This framework, including each of SB 1204's requirements and a project-specific performance evaluation, is included in Appendix B.

The proposed heavy-duty vehicle and off-road equipment projects support SB 1204's overarching vision for technology development, demonstration, pre-commercial pilot, and early commercial deployments, with a focus on moving technologies through the commercialization process.

- The on-road and off-road advanced technology demonstration projects will encourage advancement of emission reducing technologies and give confidence to fleets and investors of the pathway for these advanced technologies to enter the pilot stage of commercialization. All demonstration projects will be located within, or will benefit, disadvantaged communities.
- For the proposed bus and truck pilot projects, zero-emission technology is ready for deployment, and heavy investments now will encourage the production and purchase necessary to achieve full commercialization and enable technology transfer into other vehicle weight classes and vocations.
- The additional funding proposed for ARB's ongoing HVIP for FY 2016-17 will help increase production volumes and enhance the process toward full commercialization. Over 50 percent of pilot and HVIP funding will benefit disadvantaged communities.

As a technology moves from commercial introduction to widespread deployment, or the transition phase as shown in Figure 3 below, incentives can be adjusted to focus specifically on moving the technology into new consumer demographic segments and on building upon earlier benefits in disadvantaged communities (as well as supporting other technology sectors). In the transition phase, incentives are targeted to foster technology adoption in these communities. While SB 1204 does not focus on funding for this later phase of a technology's evolution, the AQIP-funded Truck Loan Assistance

Program is an example of this type of incentive, providing loan assistance to help small fleets access financing to upgrade their trucks.

As required by SB 1204, the proposed heavy-duty project allocations ensure that at least 20 percent of Low Carbon Transportation truck funding supports early commercial deployment of existing zero- and near zero-emission heavy-duty truck technology. As shown in Table 9, about \$90 million is proposed for heavy-duty truck projects, and about \$60 million of that total, about two-thirds, is proposed for early commercial truck deployments:

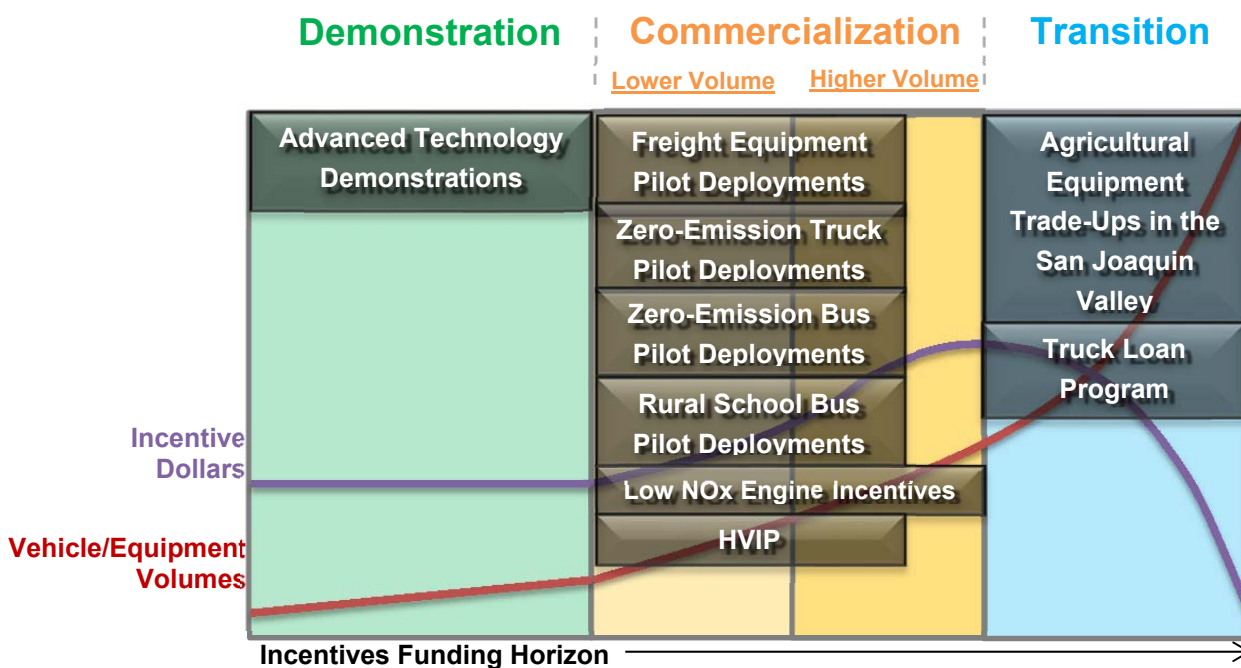
**Table 9: Proposed FY 2016-17 Heavy-Duty Truck Investments**

Project	Proposed Low Carbon Transportation Funding (million)	Early Commercial?
HVIP <sup>1</sup>	\$18	Yes
Low NOx Engines <sup>1</sup>	\$23	Yes
Truck Pilot Commercial Deployment	\$18	Yes
Advanced Technology Demonstrations: On-Road Trucks	\$30	No

<sup>1</sup>A portion of the proposed allocation is expected to fund buses, which would affect the percentage of truck funding that ultimately supports early commercial zero- and near zero-emission heavy-duty truck deployment.

The remainder of this chapter describes the proposed heavy-duty vehicle and off-road equipment projects shown in Figure 3.

**Figure 3: Proposed FY 2016-17 Heavy-Duty Vehicle and Off-Road Equipment Investments**





## Advanced Technology Demonstration Projects

Proposed Low Carbon Transportation Allocation – \$59 million
--

Advanced Technology Demonstration Projects are intended to accelerate into the California marketplace the introduction of advanced emission reducing technologies on the cusp of commercialization. In this first phase of technology advancement toward commercialization, per-vehicle incentives are high because manufacturing is not standardized and is focused on smaller batches of vehicles. Higher levels of incentives per vehicle are needed to help entrepreneurs cover the costs of technology development. A public investment in these technologies helps to achieve GHG reductions, as well as criteria pollutant and toxic air contaminant reductions, sooner than would be possible otherwise. This commitment from the State encourages industry to expeditiously invent, develop, test, and introduce cutting edge emission reducing technologies. All demonstration projects must have the potential for widespread commercialization that will significantly transform the industry while achieving GHG, criteria pollutant, and toxic emission reductions as required by SB 1204. Once demonstration projects reach the goal of market deployment, longer-term future emission reductions in considerably larger magnitudes can be achieved.

### **CURRENT PROJECT STATUS**

The FY 2014-15 Funding Plan allocated \$50 million for advanced technology demonstration projects for multi-source facilities and zero-emission drayage trucks. Competitive solicitations were released last year, and grantees have been selected. The two selected Multi-Source Facility Demonstration Projects will demonstrate multiple types of zero-emission heavy-duty off-road and on-road vehicles used in freight transport, as well as supportive fueling infrastructure, at the Port of Los Angeles and multiple freight facilities in San Bernardino and Los Angeles Counties. The Zero-Emission Drayage Truck Demonstration Project will demonstrate more than 40 zero-emission drayage trucks operating throughout California. All projects will launch in summer 2016.

Both solicitations for the demonstration projects above were oversubscribed, indicating a strong demand for advanced technology demonstration projects in the freight sector. In particular, applications requesting \$94 million in funding were received for the \$25 million Multi-Source Facility Demonstration Project.

### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes the projects shown in Table 10 to continue support for demonstrations of advanced technologies, with a priority for projects that benefit disadvantaged communities, consistent with the goals of the *Cap-and-Trade Auction Proceeds Second Investment Plan* and SB 1204. These proposed project categories

were included in the FY 2015-16 Funding Plan, but went unfunded. The projects build on previous demonstrations in on-road and off-road sectors, including the FY 2014-15 advanced technology demonstration projects described above.

**Table 10: Proposed Advanced Technology Demonstration Projects**

<b>Project Category</b>	<b>Proposed Projects</b>	<b>Proposed Allocation (million)</b>
On-Road Trucks	Intelligent Transportation Systems and Connected Trucks	\$30
	Advanced Engines and Powertrains	
	Zero- or Near Zero-Emission Short and Regional Haul Trucks	
Off-Road Freight Equipment	Zero-Emission Cargo Handling Equipment	\$18
	Zero-Emission Ground Support Equipment	
	Advanced Port Equipment	
	Zero-Emission Locomotive Technologies and Operations	
Non-Freight Off-Road Equipment	Advanced Technologies and Efficiencies for Agricultural Equipment	\$11
	Advanced Technologies and Efficiencies for Construction Equipment	
	Advanced Technologies for Passenger Transportation	

The amount of funding that will be allocated to each of the projects within these categories as well as solicitation details will be determined in the public work group meeting process beginning after Board consideration and approval of the Funding Plan. Each of the proposed project categories is described further below.

The allocations in Table 10 reflect the staff recommendation to prioritize unfunded projects from the FY 2015-16 Funding Plan first. In the event that additional Low Carbon Transportation funding becomes available for heavy-duty projects, ARB staff will allocate the additional funding to the next highest-scoring applications received in response to the FY 2014-15 Multi-Source Facility Demonstration Project solicitation and the next highest-scoring bus applications from the Truck and Bus Pilot Commercial Deployment Projects solicitation.

#### On-Road Trucks – Up to \$30 Million

Investments in on-road trucking industry transformations are needed to meet California’s climate change and air quality goals. The project categories listed below will help meet that need, in addition to needs presented in the draft *California Sustainable Freight Action Plan* for more efficient truck movement in the freight system.

*Intelligent Transportation Systems and Connected Trucks:* Technologies in this category are focused on increasing efficiencies by allowing communications between trucks and their environment, or between two or more trucks. These technologies have the potential to increase truck efficiency, thereby reducing GHG

and criteria pollutant emissions, and potential ancillary benefits such as accident avoidance. Demonstrations might include real-time communications between individual trucks while on the road to allow for more efficient logistics scheduling; increased efficiency with multiple groups of trucks working in tandem to allow for efficient braking, acceleration, accident avoidance, and other strategies; technologies that can autonomously adjust to hills and grades and traffic anticipation strategies; and other advanced strategies that increase trucking efficiency.

*Advanced Engines and Powertrains:* Advanced technologies employed in the generation of motive power have the potential to increase on-road truck efficiency and reduce emissions. Increases in engine and powertrain efficiency can help achieve California's goal of a 50 percent reduction in petroleum use by 2030. Demonstrations might include advanced engines such as microturbine, opposed-piston engines, or other advanced engine or powertrain technologies, as well as auxiliary electrification, and other strategies to reduce engine load and emissions for use in long range Class 7 and 8 trucks; and engine waste heat technology in revenue service with Class 7 and 8 trucking fleets.

*Zero-Emission or Near Zero-Emission Short and Regional Haul Trucks:* Short and regional haul trucking services are characterized by shorter daily driving distances than line-haul trucking, but longer than some drayage trucks. These trucks tend to be domiciled in a central location nightly. Trucks in this service include food distribution, warehouse to retail store transport, longer-range drayage, solid waste collection, and recyclables transfer trucks, among others. Technologies to be demonstrated could include battery electric, fuel cell electric, electric drive with range extenders, or other advanced technologies that result in significant zero-emission miles.

#### Off-Road Freight Equipment – Up to \$18 Million

Advanced technology demonstration projects in the off-road freight equipment category build upon advances from prior demonstration projects by expanding the type and numbers of zero-emission and near zero-emission off-road equipment. The following project categories are proposed for demonstrations.

*Zero-Emission Cargo Handling Equipment:* Advanced zero-emission technologies in this category have tremendous potential to reduce emissions of GHGs and criteria pollutants because cargo handling equipment is widely used in California. Cleaner technologies in this category also have the potential for broad applicability in other sectors. Demonstrations for applications that have not yet reached commercial deployment could include zero-emission technologies for high lift capacity forklifts, reach stackers, and other cargo handling equipment operating at ports or intermodal rail yards. Eligible technologies would be expected to provide zero-emission operation for at least part of the duty cycle.

*Zero-Emission Ground Support Equipment:* Projects would be designed to demonstrate advanced technologies and strategies that go beyond the current state of technology for airport ground support equipment and aircraft. Examples of technologies include battery electric, fuel cell electric, flow batteries, and strategies that can reduce emissions from aircraft while being loaded or unloaded, taxiing, and queuing. Equipment capable of zero-emission operation during a substantial part of its duty cycle may be eligible.

*Advanced Port Equipment:* Projects would be designed to demonstrate advanced technologies and strategies, such as zero-emission cargo handling equipment, zero-emission vessel automated container movement technologies, advanced logistic strategies, or other equipment or strategies that enable more efficient port operations.

*Zero-Emission Locomotive Technologies and Operations:* Projects in this category would demonstrate on-board energy storage systems to provide supplemental motive power to locomotives to reduce fuel consumption and GHGs as well as provide zero-emission operations for short periods. Projects could be designed to demonstrate locomotive tenders used for energy storage, such as batteries, and zero-emission energy generation systems, such as fuel cells, to facilitate zero-emission operation for part of the locomotive duty cycle.

#### Non-Freight Off-Road Equipment – Up to \$11 Million

The focus of proposed demonstration projects in the non-freight off-road equipment category is on transferring and expanding the technology advancements from other categories, such as applying hybrid systems from the on-road truck and bus market into other market segments like construction equipment. This category also supports expanding the application of energy storage systems into other transportation sectors, such as off-road passenger movement, (e.g., passenger locomotives, ferry vessels, etc.). The following project categories are proposed for demonstrations.

*Advanced Technologies and Efficiencies for Agricultural Equipment:* This category is intended to demonstrate and deploy advanced technologies that reduce GHG and criteria pollutant emissions for off-road mobile agricultural equipment. Projects could include low NOx engines, electric drive powertrains, hybridization, automation strategies leading to efficiency gains, and new applications for zero- or near zero-emission technologies.

*Advanced Technologies and Efficiencies for Construction Equipment:* This category is intended to demonstrate and deploy advanced technologies that reduce GHG and criteria pollutant emissions for off-road mobile construction equipment. Projects could include hybrid bull dozers or front loaders, new applications for zero- and near zero-emission technologies, and engine, powertrain, and automation strategies leading to efficiency gains.

*Advanced Technologies for Off-Road Passenger Transportation:* This category is intended to demonstrate advanced, emission-reducing technologies for in-state passenger transport. Ferry projects could include use of fixed wing sail technology that builds on successful past demonstrations or use of fuel cells or other technologies to reduce emissions. Passenger locomotive demonstrations could include fuel cells, hybrid technologies, advanced energy storage strategies, and other emission reduction technologies. Other project types may also be considered.

*Data Collection and Analysis:* Data collection is an essential component of demonstration projects. Staff estimates that up to \$3 million will be needed for independent third-party data collection and analysis to verify the emission reductions and performance of vehicles and equipment funded in such projects. This would ensure a uniform approach to collecting data across all projects, so results are more directly comparable and more useful for informing future planning and funding decisions, and in evaluating project performance and emission reductions. This would also help inform future investment opportunities for continued market development. Staff proposes that the Executive Officer have flexibility to determine the proper mechanism for funding data collection, analysis, and emission reduction verification.

*Cost Sharing Requirements:* Similar to past funding cycles, ARB continues to emphasize the importance of developing a strong public/private investment to ensure successful demonstrations of advanced technology. As such, ARB requires cost sharing from the technology demonstrator, grantee and/or the fleet or equipment end-user. Staff proposes to continue a minimum 25 percent cost share from project applicants. As with past funding cycles, applicants that provide higher overall match funding have the potential to be scored higher than projects with less match funding.

*Disadvantaged Communities Benefits:* To meet ARB's overall targets for funds spent in and benefitting disadvantaged communities, staff proposes that all funds allocated for Advanced Technology Demonstration Projects benefit disadvantaged communities, with at least \$10 million directly spent on projects located in disadvantaged communities. This is the same approach that had been proposed in the FY 2015-16 Funding Plan.

*Project Solicitation:* ARB will issue grant solicitations that clearly identify eligible project categories and maximum funding available. As in previous years, eligible grantees are public agencies (including air districts, ports, cities, and counties) and non-profit organizations with relevant experience.

## **OUTCOMES**

The proposed allocation for Advanced Technology Demonstration Projects would provide an estimated 14,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Appendix A provides additional details on the emission estimates. Staff proposes to develop applicable metrics of success that align with the goals and required results for each specific project, include them with the project solicitation, and, where feasible, ensure the project proposals be structured to enable collection of data to inform these

metrics. Applications for demonstration project funding will detail the individual project's metrics for success and compare the results for each project with the application's stated goals, the requirements of the solicitation, and the Funding Plan. Successful projects will use fundamental metrics to demonstrate the potential for future cost-effective emission reductions in the specific demonstration project category and the potential for widespread commercial acceptance of the demonstrated technology.

A long-term demonstration program, with sustained, multiyear funding directed at the acceleration of advanced technologies into the California marketplace will help meet the State's long-term GHG and criteria pollutant emission reduction goals. The transition toward zero-emission and near zero-emission technologies in on-road, off-road, locomotive, and other heavy-duty categories requires the State's continued strong financial commitment. This significant investment signals to vehicle and equipment manufacturers as well as end-users that their investments will help develop a strong market, reducing manufacturing and operational costs while benefitting disadvantaged communities.

# Zero-Emission Freight Equipment Pilot Commercial Deployment Project

Proposed Low Carbon Transportation Allocation – \$5 million
---

## **PROJECT OVERVIEW**

Zero-emission technologies are commercially available and have been in use in a small number of off-road freight applications for years. These include battery electric and fuel cell electric forklifts with lower lift capacities, certain types of cargo handling equipment, and airport ground support equipment. However, these technologies are just entering the market or have not yet achieved substantial market penetration for many other freight applications. For example, zero-emission conversions for yard trucks have only recently become commercially available, and cryogenic transport refrigeration units (TRUs) are now transitioning from the demonstration to early commercial deployment phase. This project will provide incentives for larger deployments in these new and emerging commercial applications to support zero-emission transformation of the off-road freight fleet.

## **STAFF PROPOSAL FOR FY 2016-17**

The intent of this project is to accelerate deployment and drive consumer acceptance in the early stages of commercialization. At the same time, project applications will give ARB staff the opportunity to assess multiple equipment types at various stages of commercialization and better plan for future freight project funding opportunities. Eligible types of equipment and technologies include zero-emission freight technologies in the early or low volume stages of commercial deployment for forklifts, cargo handling equipment, railcar movers, airport ground support equipment, and TRUs, among others. All vehicles and equipment would be expected to operate with zero emissions for their entire duty cycle. Fueling infrastructure to support project vehicles or equipment would also be eligible for funding.

*Disadvantaged Community Benefits:* Staff proposes that at least 50 percent of funds allocated for the Zero-Emission Freight Equipment Pilot Commercial Deployment Project benefit disadvantaged communities. All vehicles and equipment would need to be operated at a freight related facility, such as a port, intermodal rail yard, distribution center, warehouse, or freight hub. Because so many freight facilities are located in or near disadvantaged communities, ARB staff hopes to exceed these minimum requirements. To determine whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies That Administer California Climate Investments*. ARB will include provisions in both project solicitations and grant agreements to ensure these requirements are met.

*Cost Sharing Requirements:* Staff proposes that the maximum cost share provided by ARB for this project be 75 percent, consistent with other Low Carbon Transportation project categories such as the Advanced Technology Demonstration Projects. Ability to leverage significant additional match funding (beyond the minimum 25 percent applicant contribution) will be an important criterion within the competitive process.

*Project Solicitation:* Staff proposes releasing a project solicitation for the full \$5 million funding allocation. The number of projects selected for funding will depend on the number of applications and strength of each application but could include one or more projects. The project solicitation will be open to public agencies (including air districts, ports, cities, and counties) as well as non-profit organizations with relevant experience. The solicitation will define the scoring criteria to be used by ARB to evaluate applications, including elements such as GHG emission reductions, benefits to disadvantaged communities, and potential for technology transfer to other freight sources.

## **OUTCOMES**

The proposed allocation for the Zero-Emission Freight Equipment Pilot Project would provide an estimated 49,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Appendix A provides additional details on the emission estimates. Staff proposes to develop applicable metrics of success, include them with the project solicitation, and, where feasible, ensure the project proposals be structured to enable collection of data to inform these metrics. Metrics will focus on achievement of technology price reductions, manufacturer diversity, applicability to broader types of equipment, consumer acceptance, emission reductions, and any additional metrics stemming from discussions with stakeholders in future work group meetings.

Staff will assess the scalability of the projects funded in the first year of this pilot and will analyze the most promising scalable projects to promote their continuation and expansion in future years. This expansion has the potential to transition a targeted subset of projects to a first-come, first-served basis, similar to HVIP and CVRP. For example, if an initial pilot project for zero-emission yard trucks is successful and demand warrants, staff could propose a voucher-based project for zero-emission yard trucks.

Although zero-emission freight equipment is still at the early stages of commercialization, staff expects the pilot project to also work as a catalyst to spur technology development. Staff intends to design the pilot project in a way that is adaptable and can be adjusted each year to broaden the types of pilots funded as additional promising zero-emission freight equipment is introduced.



# Zero-Emission Truck Pilot Commercial Deployment Project

Proposed Low Carbon Transportation Allocation – \$18 million
--

## **PROJECT OVERVIEW**

Zero-emission truck and bus pilot commercial deployment projects are designed to complement HVIP to support larger-scale deployments of zero-emission vehicles, thereby accelerating their introduction and market penetration. In the FY 2014-15 Funding Plan, ARB allocated \$25 million in Low Carbon Transportation funding to this category. ARB intended to augment this allocation with an additional \$60 million (\$20 million for trucks and \$40 million for transit/shuttle/school buses) in the FY 2015-16 Funding Plan. However, this additional funding was deferred because of the smaller than anticipated FY 2015-16 Low Carbon Transportation budget appropriation.

This project would place a significant number of zero-emission trucks in a handful of strategic “hubs,” encouraging advanced technology clusters with infrastructure, marketing, workforce training, and other synergies. The technology hub or ecosystem concept, when fully implemented, can help address many of the deployment challenges we see today by supporting economies of scale in manufacturing, vehicle maintenance and repair, and infrastructure issues.

## **CURRENT PROJECT STATUS**

In October 2015, ARB released a \$25 million competitive solicitation for this project category.<sup>18</sup> The solicitation was greatly oversubscribed, with funding requests totaling about \$290 million, with about \$32 million in truck funding requests. The solicitation included provisions for adding \$60 million (including \$20 million for trucks) if funding is appropriated by the Legislature. All of the applications have been scored, and staff has notified preliminarily selected project applicants.

## **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes allocating \$18 million toward the highest-scoring remaining truck applications from the October 2015 solicitation for commercially available zero- and near zero-emission freight and delivery trucks. Staff proposes selecting projects using the solicitation’s established criteria and process, which follows the framework approved in the FY 2015-16 Funding Plan. The project is intended to fund large scale deployments of heavy-duty trucks (>14,000 pounds gross vehicle weight rating (GVWR)) used in delivery or freight vocations, as well as accompanying fueling infrastructure and supporting vehicle service and repair facility upgrades. Eligible trucks include zero-emission battery electric and fuel cell electric delivery or freight trucks, near

---

<sup>18</sup>The solicitation for the Truck and Bus Pilot Commercial Deployment Project is available at <http://www.arb.ca.gov/msprog/aqip/solicitations.htm>.

zero-emission delivery or freight trucks with the capability to operate in zero-emission only mode, and conversions of any type of delivery or freight truck to zero-emission technology. All technologies are required to be commercially available. Additional project eligibility requirements are described in the solicitation.

*Disadvantaged Community Benefits:* Staff proposes that at least 75 percent of the funding allocated for the Zero-Emission Truck Pilot Commercial Deployment Project benefit disadvantaged communities. To determine whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies That Administer California Climate Investments*. ARB included provisions in the project solicitation and will include them in grant agreements to ensure these requirements are met.

*Project Solicitation:* As discussed earlier, a competitive solicitation for the FY 2014-15 funding was released last year, which included provisions for adding additional funding if appropriated by the Legislature. Staff would work to expeditiously execute grant agreements and grant amendments for FY 2016-17 funds upon Board approval and appropriation of funds in the State budget. Based on this approach, another solicitation will not be released.

## **OUTCOMES**

The proposed allocation would fund an estimated 66 trucks and provide an estimated 24,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Appendix A provides additional details on the emission estimates. The solicitation includes metrics (such as zero-emission mile accumulation, fuel and energy usage, reliability, vehicle maintenance and operation costs, and infrastructure costs) that ensure project proposals are structured to enable collection of data needed to inform the metrics and to help illustrate how well the projects accelerate technology deployment and achieve consumer acceptance. ARB will require independent third party data collection and analysis to support these pilot commercial deployment projects. This will ensure a uniform approach to collecting data across all the heavy-duty projects, so results are directly comparable.

In evaluating future funding, ARB will consider the potential to expand upon the initial pilot projects and with technology deployment opportunities. Depending on the success of this project, staff may propose shifting pilot deployment project investments to a first-come, first-served model in the FY 2017-18 funding cycle or a later funding cycle.

# Zero-Emission Bus Pilot Commercial Deployment Project

Proposed Low Carbon Transportation Allocation – \$42 million
--

## **PROJECT OVERVIEW**

As noted in the previous section, ARB designed zero-emission truck and bus pilot commercial deployment projects to support larger-scale deployments of zero-emission vehicles, thereby accelerating their introduction and market penetration. \$25 million for zero-emission trucks and buses from the FY 2014-15 Funding Plan is being awarded via a competitive solicitation which was released in October 2015 and closed in January 2016. However, the FY 2015-16 allocation of \$40 million for zero-emission buses included in the solicitation was deferred because of the smaller than anticipated FY 2015-16 Low Carbon Transportation budget appropriation.

This project would place a significant number of zero-emission buses in a handful of strategic “hubs,” encouraging advanced technology clusters with infrastructure, marketing, workforce training, and other synergies. The technology hub or ecosystem concept, when fully implemented, can help address many of the deployment challenges we see today by supporting economies of scale in manufacturing, vehicle maintenance and repair, and infrastructure issues.

## **CURRENT PROJECT STATUS**

In October 2015, ARB released a \$25 million competitive solicitation for this project category.<sup>19</sup> As described in the previous section, the solicitation was significantly oversubscribed. The solicitation included provisions for adding \$60 million (\$20 million for trucks and \$40 million for transit/shuttle/school buses) if funding is appropriated by the Legislature. All of the applications have been scored, and staff has notified preliminarily selected project applicants.

## **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes allocating \$42 million toward the highest-scoring remaining bus applications from the October 2015 solicitation for commercially available zero- and near zero-emission bus projects. ARB staff proposes selecting projects using the solicitation’s established criteria and process, which follows the framework approved in the FY 2015-16 Funding Plan, including the requirement that at least half the funding be awarded to projects located in disadvantaged communities. The project is intended to fund large scale deployments of medium- and heavy-duty (>8,500 pounds GVWR) urban transit buses, shuttle buses, and school buses as well as accompanying fueling infrastructure and supporting vehicle service and repair facility upgrades. Eligible buses

---

<sup>19</sup>The solicitation for the Truck and Bus Pilot Commercial Deployment Project is available at <http://www.arb.ca.gov/msprog/aqip/solicitations.htm>.

include zero-emission battery electric and fuel cell electric urban transit buses, shuttle buses, and school buses; near zero-emission urban transit buses, shuttle buses, and school buses with the capability to operate in zero-emission only mode; and conversion of any type of urban transit buses, shuttle buses, and school buses to zero-emission technology. All technologies are required to be commercially available. Additional project eligibility requirements are stated in the solicitation. A separate project category for school buses in rural districts is included in the next section.

*Disadvantaged Community Benefits:* Staff proposes at least 75 percent of the funding allocated for the Zero-Emission Bus Pilot Commercial Deployment Project benefit disadvantaged communities, with at least half of the funding for projects located in disadvantaged communities. To determine whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies That Administer California Climate Investments*. ARB included provisions in the project solicitation and will include them in grant agreements to ensure these requirements are met.

*Project Solicitation:* As discussed earlier, a competitive solicitation for the FY 2014-15 funding was released last year, which included provisions for adding additional funding if appropriated by the Legislature. Staff would work to expeditiously execute grant agreements and grant amendments for FY 2016-17 funds upon Board approval and appropriation of funds in the State budget. In the event that additional Low Carbon Transportation funding becomes available for heavy-duty projects, ARB staff will allocate the additional funding to the next highest-scoring bus applications received in response to the Zero-Emission Truck and Bus Pilot Commercial Deployment Projects solicitation and the next highest-scoring applications received in response to the Multi-Source Facility Demonstration Project solicitation.

## **OUTCOMES**

The proposed allocation would fund an estimated 43 buses and provide an estimated 39,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions as described in Appendix A. The solicitation includes metrics (such as zero-emission mile accumulation, fuel and energy usage, reliability, vehicle maintenance and operation costs, and infrastructure costs) that ensure project proposals are structured to enable collection of data needed to inform the metrics and to help illustrate how well the projects accelerate technology deployment and achieve consumer acceptance. ARB will require independent third party data collection and analysis to support these pilot commercial deployment projects. This will ensure a uniform approach to collecting data across all the heavy-duty projects, so results are directly comparable.

In evaluating future funding, ARB will consider the demand and strength of proposed project applications received during the solicitation. ARB will also evaluate the ability to expand upon the initial project and new technology deployment opportunities. Staff may recommend shifting the pilot deployment project funding to a first-come, first-served model in the FY 2017-18 funding cycle or a later funding cycle.

# Rural School Bus Pilot Project

Proposed Low Carbon Transportation Allocation – \$10 million
--

## **PROJECT OVERVIEW**

The Rural School Bus Pilot Project will provide funding for zero- and near zero-emission school buses increasing zero-emission miles and prioritizing applicants in small air districts first, then medium air districts, and then large air districts. This pilot project will also provide funding for new conventional-fueled school buses that use renewable fuels. In addition, this pilot project will provide immediate GHG emission reductions and reduce school children's exposure to both cancer-causing and smog-forming pollution.

This pilot project was included in the FY 2015-16 Funding Plan with a \$5 million allocation with the anticipation that additional funds would be allocated in future years. However, ARB was not able to fund this pilot project because of the smaller than anticipated FY 2015-16 Low Carbon Transportation budget appropriation.

## **STAFF PROPOSAL FOR FY 2016-17**

For FY 2016-17, ARB staff proposes allocating \$10 million for this project. In anticipation of including this project in this Funding Plan, ARB staff met with stakeholders and held a public work group meeting on November 16, 2015 to shape project specifications and identify a potential project administrator. As a result of stakeholder feedback, staff is proposing the following project parameters.

ARB staff proposes to give funding priority to school buses used in small and medium air districts because those school bus owners have less access to local funds, including DMV fees and other funding sources, than school bus owners located in large air districts where greater funding opportunities are available. However, school buses located in large air districts would be eligible to receive funding if projects in small and medium air districts do not materialize.

Funding would be made available for the purchase of new fuel cell and battery electric zero-emission school buses or near zero-emission plug-in hybrid school buses including funding for associated vehicle charging and/or fueling equipment. Applicants applying for zero-emission school buses may receive funding for up to three buses.

In addition, funding would be available for new school buses with internal combustion engines or hybrid school buses operating on renewable fuels, including renewable diesel, renewable natural gas, and renewable propane. Funding will also be available for the additional costs associated with purchasing renewable fuels. Applicants applying for a school bus with an internal combustion engine must replace an older, higher-emission, operational school bus. School bus owners may only receive funding for one conventional fueled school bus replacement in this first round of funding.

Finally, staff worked with the California Air Pollution Control Officers Association to identify the North Coast Unified APCD as a potential administrator of this pilot project. Staff proposes entering into a grant agreement with the North Coast Unified APCD to administer this pilot project.

As this pilot project is administered, staff may make modifications to project parameters. If staff believes changes are necessary, then these changes will be presented in a public work group process.

*Disadvantaged Community Benefits:* At this time, it is not possible to estimate in advance exactly how many school bus projects will benefit disadvantaged communities. As part of the reporting requirements for this pilot project, ARB will be able track where these funds are spent and can determine which projects provide benefits to disadvantaged communities.

*Project Solicitation:* The pilot project administrator will issue a competitive, statewide solicitation to school districts for project applications, with priority for eligible school bus owners located in small air districts first, then medium air districts, and then large air districts. Project applications will be required to be received during the application request period in order to be considered for funding and will be ranked by the selection criteria included in the solicitation.

## **OUTCOMES**

This project encourages the turnover of the California school bus fleet to lower carbon transportation choices. The proposed allocation would fund about 30 to 60 new school buses, depending on the technology and school bus size purchased, providing an estimated 10,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Appendix A provides additional details on the emission estimates. Criteria pollutant and toxic air contaminant emission reductions are also expected as the advanced technology school buses replace conventional-fueled engines. Metrics such as data on zero-emission miles, technology type, and renewable fuel use will be used to assess the success of these incentives.

With approximately 20,000 conventional-fueled school buses operating throughout California, this pilot project provides opportunities to transform California's school bus fleet and meet zero-emission vehicle deployment goals along with near-term and long-term air quality goals. Additional funding will be needed to continue this work as staff expects demand for advanced technology school buses to continue for several years.

# Low NOx Engine Incentives

Proposed Low Carbon Transportation Allocation – \$23 million
--

## **PROJECT OVERVIEW**

ARB's optional low NOx standards allow manufacturers the ability to certify heavy-duty vehicle engines to NOx emission levels that are up to 90 percent lower than today's mandatory diesel emission standards. Incentivizing deployment of these engines coupled with renewable fuels is an important strategy for achieving both near-term and long-term reductions of GHG and criteria pollutant emissions in the heavy-duty sector. This project is intended to fund the incremental cost of a heavy-duty vehicle engine above the purchase and installation costs of a conventional heavy-duty vehicle engine with the same fuel type and other characteristics. The incentivized engine must be used in a bus or truck greater than 14,000 pounds GVWR. Both engine repowers and new vehicle purchases would be eligible. The project would continue to be implemented through HVIP on a first-come, first-served, statewide basis with fleets able to secure a voucher through their local participating dealership as part of their engine repower or vehicle purchase order.

## **CURRENT PROJECT STATUS**

Since the introduction of this project in the FY 2015-16 Funding Plan, ARB has certified the first low NOx heavy-duty engine. The Cummins 8.9 liter natural gas engine for both bus and truck duty cycles was certified in September 2015 to the lowest NOx level (0.02 grams per brake horsepower-hour (g/bhp-hr)) of the three optional low NOx standards. These engines are now available for purchase. The FY 2015-16 Funding Plan allocated \$2 million in AQIP funding for low NOx engine incentives, and ARB intends to implement that portion of the project through HVIP, as described in the HVIP section of this chapter.

## **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes a \$23 million allocation from Low Carbon Transportation investments for low NOx engine incentives in order to meet the expected demand for the funding cycle. Staff proposes a maximum of \$18,000 per engine incentive for the certified 8.9 liter natural gas engine that utilizes renewable fuel, as explained below. This incentive could be combined with other State incentives such as the Energy Commission's natural gas vehicle incentives, Proposition 1B funding, and Carl Moyer Program funding. As other low NOx engines come to market, staff will propose appropriate incentive amounts for those engines.

**Renewable Fuel Requirement:** Since replacing conventional natural gas engines with low NOx engines does not in itself provide GHG emission benefits, renewable fuels would be required to ensure GHG emission reductions. Low NOx engines or vehicles

purchased using this incentive would be required to have a fueling contract that incorporates 100 percent renewable fuel for the low NOx engines in the owner's heavy-duty on-road fleet for a period of at least three years. Implementation provisions for this element would be determined during the public work group process following Board approval of the Funding Plan.

*Disadvantaged Community Benefits:* Low NOx engine incentives will continue to be implemented on a first-come, first-served, statewide basis, so it is not possible to estimate in advance exactly how much funding will benefit disadvantaged communities. However, staff expects similarly high participation rates currently experienced in HVIP. About two-thirds of Low Carbon Transportation funding for HVIP to date has provided benefits to disadvantaged communities, and about 45 percent of the funding has been spent in disadvantaged communities.

ARB will track where these funds are spent, so it can calculate the portion that benefits disadvantaged communities. In Table 3 (Chapter 2), staff included an estimate that at least half of the FY 2016-17 low NOx engine incentives will benefit disadvantaged communities in order to demonstrate how ARB will meet its overall disadvantaged communities investment commitment.

*Project Solicitation:* As noted above, staff proposes to continue implementing this project for the FY 2016-17 allocation through HVIP, which is administered by a grantee selected through a competitive solicitation. The HVIP section of this chapter includes additional information regarding that process.

## **OUTCOMES**

The proposed allocation would fund about 1,200 low NOx engines using renewable fuel, meeting expected demand for FY 2016-17 and providing an estimated 94,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Staff also estimates about 220 tons of criteria pollutant emissions would be reduced as the advanced technology engines replace conventional natural gas engines. Appendix A provides additional details on the emission estimates. Metrics such as aggregated data on vehicle mileage, vocations, and renewable fuel use will be used to assess the success of low NOx engine incentives.

Incentive funding for low NOx engines is expected to continue for multiple years to support larger-scale deployment of these vehicles in the California fleet. As more engines are certified and introduced into the market in future funding cycles, ARB staff expects the incentive funding allocated to this category to increase. Allocations would be based on engine availability, demand, and incremental costs, and staff would determine the most suitable program, including the Carl Moyer Program and other local funding sources, through which to implement future funding.



## **HVIP**

Proposed Low Carbon Transportation Allocation – \$18 million

Remaining FY 2015-16 Demand (through Sept 2016) – \$5 million

FY 2016-17 (Oct 2016-Sept 2017) – \$13 million

### **PROJECT OVERVIEW**

HVIP is the nation's first program to directly reduce the up-front cost of hybrid or zero-emission trucks and buses, with fleets able to secure a voucher through their local participating dealership as part of their vehicle purchase order. HVIP is intended to encourage and accelerate the deployment of zero-emission and hybrid trucks and buses and heavy-duty vehicles using engines that meet the optional low NOx standard, which is an addition to the project beginning with FY 2015-16. HVIP incentives drive manufacturing production and fleet acceptance of the advanced heavy-duty vehicle technologies California must deploy to meet its long-term air quality and climate goals. Consumer incentives are needed because these products generally cost more than their conventional counterparts, which can be a significant deterrent to their purchase. This streamlined approach – with eligible vehicles and preset voucher amounts available on a first-come, first-served basis – has proven popular with vehicle dealers, manufacturers, and California fleets.

In the near-term, HVIP must incentivize more vehicle manufacturers to come to market with fully integrated hybrid truck and bus systems – in which the engine and driveline are specifically manufactured to work together seamlessly in a diversity of vocations and platforms – to maximize operational efficiency and ensure in-use emission benefits. Series hybrid technologies, where a vehicle is equipped with an electric drive system that is powered by an on-board generator, is particularly well-suited to help commercialize zero-emission technologies, provide zero-emission miles, and serve as a pathway to help zero-emission technologies mature in the heavy-duty sector.

In addition, HVIP must continue to help accelerate demand for zero-emission trucks and buses as well as engines meeting the optional low NOx standards, while providing benefits to disadvantaged communities.

### **CURRENT PROJECT STATUS**

Since its launch in 2010, HVIP has provided over \$85 million to help California fleets purchase about 460 zero-emission trucks and buses and over 2,000 hybrid trucks. HVIP provides vouchers of up to \$95,000 per vehicle for California purchasers and lessees of zero-emission trucks and buses, and up to \$30,000 per vehicle for eligible hybrid trucks and buses, on a first-come, first-served basis. In addition, HVIP provides increased incentives for vehicles that provide benefits to disadvantaged communities. These fleets qualify for vouchers up to \$110,000 for zero-emission trucks and buses. New to HVIP for the 2015-16 fiscal year, engines certified to an optional low NOx

standard used in heavy-duty vehicles above 14,000 pounds GVWR will be eligible for a voucher of up to \$15,000. More information on this addition is provided below. Zero-emission vehicle conversion eligibility and a telematics requirement were also added to HVIP in FY 2015-16.

HVIP is also structured to enable leveraging of local, State (such as Carl Moyer Program and Proposition 1B), and federal funding. Air districts and State agencies have, in the past, provided HVIP voucher enhancements to help accelerate fleet demand for hybrid and zero-emission trucks and buses. These investments enable air districts to accelerate advanced technology deployment within their region, while maintaining the streamlined, statewide HVIP structure needed to drive production economies of scale and accelerate market growth.

As noted in the previous section, \$2 million in FY 2015-16 AQIP funding will be available this spring through HVIP to offset the incremental cost of heavy-duty vehicle engines certified to an optional low NOx standard, and an additional \$23 million from Low Carbon Transportation investments for FY 2016-17 is being proposed to incentivize these engines. Renewable fuel use will be optional for vouchers funded by AQIP. Low NOx vouchers may be provided for engine repowers and new vehicles.

Tables 11 and 12 summarize the types of vehicle vocations and weight classes receiving HVIP funding thus far.

**Table 11: Vouchers Issued by Vocation**

<b>Vehicle Type</b>	<b>Vouchers Issued</b>	<b>Total Voucher Funds</b>	<b>Average Voucher</b>	<b>% of Total Vouchers</b>
Parcel Delivery	1,025	\$25,445,000	\$24,824	41%
Beverage Delivery	449	\$14,887,000	\$33,156	18%
Other Truck <sup>1</sup>	432	\$10,630,000	\$24,606	17%
Food Distribution	192	\$4,895,000	\$25,495	8%
Uniform & Linen Delivery	112	\$2,800,000	\$25,000	4%
Tow Truck	75	\$2,373,000	\$31,640	3%
LP Pick-up & Delivery	47	\$942,000	\$20,043	2%
Refuse Hauler	25	\$1,007,000	\$40,280	1%
School Bus	15	\$477,350	\$31,823	1%
Shuttle Bus	52	\$2,971,776	\$57,150	2%
Utility Truck	13	\$371,000	\$28,538	0.5%
Urban Bus	50	\$4,675,000	\$93,500	2%
Dump Truck	4	\$103,000	\$25,750	0.2%
Other Vehicles	15	\$980,000	\$65,333	0.6%
<b>Total</b>	<b>2,506</b>	<b>\$72,557,126</b>	<b>\$28,953<sup>2</sup></b>	<b>100%</b>

Through March 31, 2016.

<sup>1</sup>Examples include asphalt trucks, moving trucks, and other delivery trucks.

<sup>2</sup>Overall average for all HVIP vouchers issued to date.

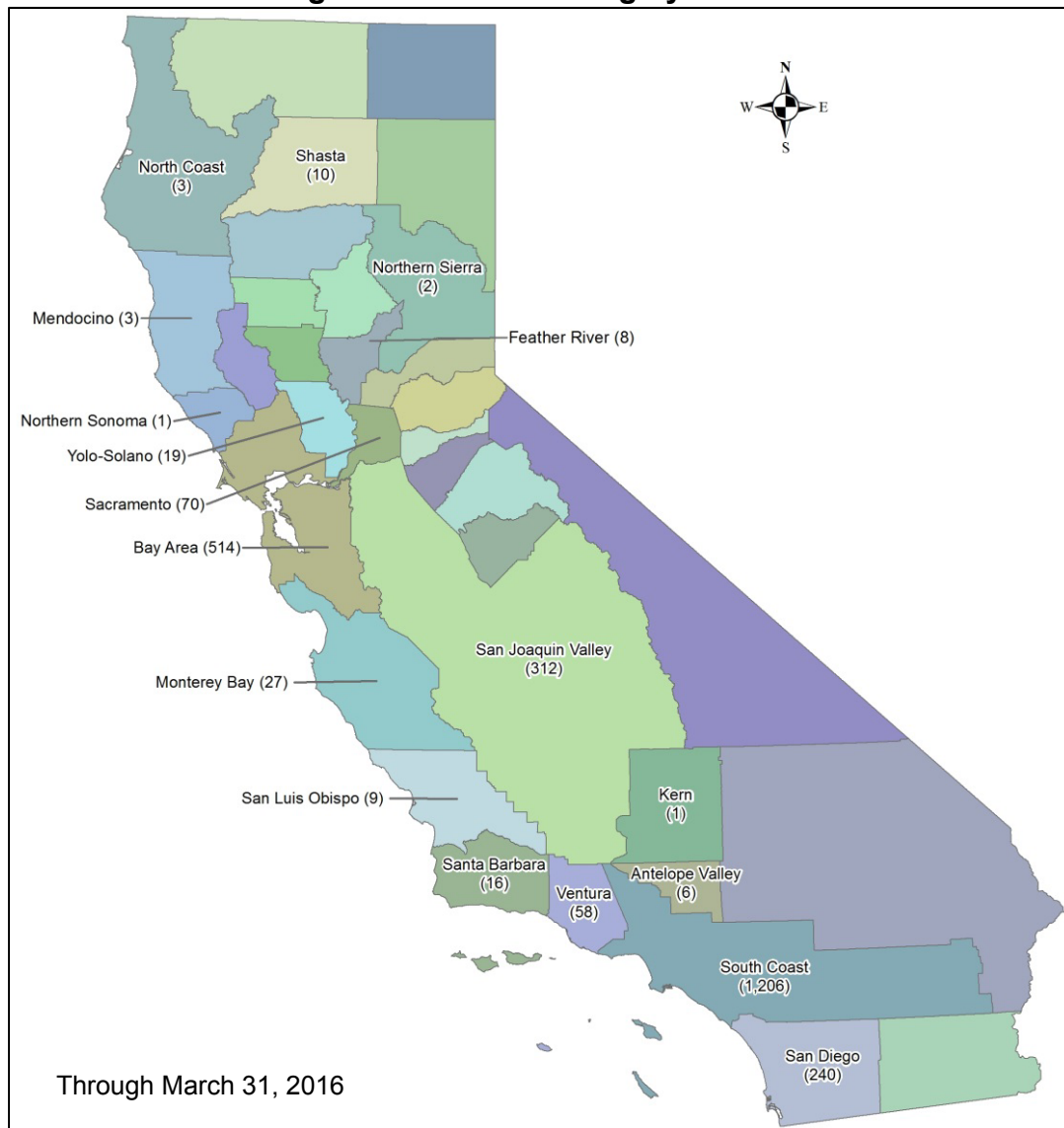
**Table 12: Vouchers Issued by Gross Vehicle Weight Range**

Gross Vehicle Weight Range	Vouchers Issued	Total Voucher Funds	% of Total Vouchers
5,001 – 6,000 lbs.	51	\$653,000	2%
6,001 – 10,000 lbs.	0	\$0	0%
10,001 – 14,000 lbs.	73	\$3,005,000	3%
14,001 – 19,500 lbs.	1,433	\$38,190,350	57%
19,501 – 26,000 lbs.	368	\$8,790,000	15%
26,001 – 33,000 lbs.	112	\$3,611,776	4%
>33,000 lbs.	469	\$18,307,000	19%
<b>Total</b>	<b>2,506</b>	<b>\$72,557,126</b>	<b>100%</b>

Through March 31, 2016.

Figure 4 lists the distribution of vouchers by air district.

**Figure 4: HVIP Funding by Air District**



The pathways for certification of new vehicles and engines are specified in regulatory certification procedures, with important differences depending upon vehicle size. In general, Class 1 through 3 vehicles (cars and light trucks below 14,001 lbs) must be certified to meet emissions, OBD (On-Board Diagnostic), warranty, and other requirements *as a complete vehicle*. In contrast, heavy-duty engines for use in Class 4 through 8 vehicles (trucks and buses above 14,000 lbs) are certified before being integrated into a vehicle. In December 2013, the Board approved Heavy-Duty Hybrid-Electric Vehicle Certification Procedures, providing voluntary, vehicle-based certification procedures to validate emission benefits of new hybrid trucks and buses.<sup>20</sup>

For hybrid manufacturers unwilling to pursue the optional full vehicle certification, a second option for a hybrid vehicle to become HVIP-eligible is available. Hybrid vehicle manufacturers may perform in-use or chassis dynamometer emission testing. Staff believes this dual path for HVIP-eligibility balances the need to ensure expected emission benefits, while providing an HVIP-eligibility pathway for manufacturers not yet ready for full vehicle certification. Staff expects that eventually full vehicle certification will be a requirement for HVIP-eligibility.

HVIP offers voucher enhancements for plug-in or hydraulic hybrids, school buses, hybrid vehicles receiving ARB's full vehicle certifications, fast charge capable ZEVs, OBD certified vehicles, aerial boom vehicles with electrified power takeoff (ePTO), and vehicles with extended warranties. The total voucher amount – including the HVIP base voucher, HVIP voucher enhancements, and all other public incentives – may not exceed 90 percent of the total vehicle cost. Public fleet school buses and public transit buses are exempt from this 90 percent limit. Voucher amounts are included in Appendix E, HVIP Terms and Conditions and Implementation Manual.

### **STAFF PROPOSAL FOR FY 2016-17**

Staff expects demand to increase over the next year; therefore, staff proposes an \$18 million allocation for FY 2016-17. Staff expects that FY 2015-16 funding will be expended prior to September 2016 (when staff expects to have a project administrator in place for the FY 2016-17 cycle after a competitive solicitation process). In order to provide uninterrupted funding until a grantee is selected to administer FY 2016-17 funding, ARB staff proposes that \$5 million of the \$18 million be incorporated via a grant amendment into the FY 2015-16 HVIP grant currently administered by CALSTART. The remaining \$13 million for FY 2016-17 would be awarded to a project administrator via competitive solicitation as explained further below.

---

<sup>20</sup> ARB, Staff Report: Initial Statement of Reasons for Proposed Rulemaking; Proposed Greenhouse Gas (GHG) Regulations for Medium- and Heavy-Duty Engines and Vehicles, Optional Reduced Emission Standards for Heavy-Duty Engines, and Amendments to the Tractor-Trailer GHG Regulation, the Diesel-Fueled Commercial Motor Vehicle Idling Rule, and the Heavy-Duty Hybrid-Electric Vehicles Certification Procedures, 2013. <http://www.arb.ca.gov/regact/2013/hdghg2013/hdghg2013.htm>

*Certification of Conversions:* New hybrid and hybrid vehicle conversions will continue to be held to the current eligibility requirements specified in HVIP until the Innovative Technology Regulation<sup>21</sup> is adopted by the Board and becomes effective. Once the regulation is adopted, staff proposes that hybrid vehicle conversion manufacturers be required to follow emission testing requirements specified in the regulation for a pathway to HVIP funding eligibility. This new regulation would provide certification and aftermarket parts approval flexibility for innovative heavy-duty engine and vehicle technologies.

*Transit Bus Vouchers:* Currently, vouchers for transit buses and vans are based on GVWR. Based on input from stakeholders during public work group meetings, ARB staff proposes basing transit voucher amounts on bus and van length. Additionally, vouchers for buses and vans would be organized by vehicle type (e.g., fuel cell and battery electric transit buses and motor coaches).

*Inductive Charging Technology:* HVIP offers voucher enhancements for innovative technologies that further promote ARB clean air policy goals. ARB staff proposes building on existing voucher enhancements for fast charge capable vehicles by adding a voucher enhancement for vehicles that are equipped with inductive charging technology to help offset the associated additional costs. This wireless technology provides an additional approach to vehicle charging that helps to minimize potential infrastructure barriers faced by some fleets.

*Charging and Fueling Infrastructure:* Charging and fueling infrastructure is a critical element to the successful deployment and consumer acceptance of zero-emission and plug-in hybrid vehicles. ARB staff proposes working with stakeholders in the coming fiscal year to find opportunities for future funding cycles to meet the demand for heavy-duty infrastructure for battery electric and fuel cell electric trucks and buses.

*Waiting List Provision:* Staff anticipates that the proposed HVIP allocation will meet voucher demand for the full funding cycle, but acknowledges the uncertainties in forecasting demand. Staff proposes that the Board provide the Executive Officer discretion to establish a waiting list to bridge a funding gap between budget years in the event that HVIP runs short of funding prior to the end of FY 2016-17.

*Disadvantaged Community Benefits:* HVIP will continue to be implemented on a first-come, first-served, statewide basis, so it is not possible to estimate in advance exactly how much funding will benefit disadvantaged communities. However, project elements encourage funding for these areas, such as higher voucher amounts for vehicles that provide benefits to disadvantaged communities. About two-thirds of Low Carbon Transportation funding for HVIP to date has provided benefits to disadvantaged communities, and about 45 percent of the funding has been spent in disadvantaged communities as reported in the March 2016 *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds*. To determine

---

<sup>21</sup>For more information on the Innovative Technology Regulation, see <http://www.arb.ca.gov/msprog/itr/itr.htm>

whether investments are in or benefiting disadvantaged communities, ARB uses the criteria to evaluate projects specified in the *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies That Administer California Climate Investments*.

Staff expects a similar percentage of future HVIP vouchers will benefit these communities. As part of the reporting requirements associated with Cap-and-Trade auction proceeds funding, ARB will track where these funds are spent, so it can calculate the portion that benefits disadvantaged communities. In Table 3 (Chapter 2), staff included a conservative estimate that at least 60 percent of the FY 2016-17 HVIP funding will benefit disadvantaged communities in order to demonstrate how ARB will meet its overall disadvantaged communities investment commitment.

**Terms and Conditions:** When HVIP was established, ARB and the project administrator developed Terms and Conditions to highlight the policies set forth by the Board in more detail for HVIP participants, and ensure a fair, equitable, and responsible project. More specifically, the HVIP Terms and Conditions are intended to notify potential participants of the core requirements of the program prior to submitting an application. Additionally, ARB and the project administrator developed an Implementation Manual to further define these rules and explain roles and responsibilities. In an effort to ensure that the Board is updated on the status of these items, staff has included a copy of the current Terms and Conditions and Implementation Manual as an Appendix E to the Funding Plan. These documents are updated periodically throughout the year to reflect project changes after the Board adopts each funding plan and as other changes are necessary to provide further clarity.

**Project Solicitation:** ARB will conduct a competitive solicitation to select a grantee to administer HVIP. Currently, ARB solicits for a grantee every two years. ARB staff proposes extending this time frame to allow ARB to conduct a three-year solicitation. While the solicitation would encompass up to three fiscal years, the grant agreement would initially cover one fiscal year with the option to renew for each of the following two years. The solicitation would be released after the Board approves the FY 2016-17 Funding Plan and the State Budget is signed. Staff anticipates having a grant in place for the FY 2016-17 by the end of September 2016.

## **OUTCOMES**

The proposed HVIP allocation is expected to fund about 500 zero-emission and hybrid vehicle vouchers, meeting expected demand and providing an estimated 64,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions. Staff also estimates about 140 tons of criteria pollutant emissions would be reduced as the advanced technology vehicles replace conventional diesel trucks and buses. Appendix A provides additional details on the emission estimates.

The hybrid and zero-emission heavy-duty truck and bus markets are still at the very early stages of commercialization. Production capacity has substantial growth potential for both hybrid and electric trucks and buses, but current low production volumes contribute to an \$18,000 to \$60,000 vehicle cost premium for new hybrid trucks, up to

\$170,000 for battery electric zero-emission trucks, and up to \$500,000 for battery electric zero-emission buses. ARB expects production costs to decline as hybrid driveline and battery production volumes increase. When this occurs, the fuel economy payback period should shorten to the point where a hybrid or zero-emission truck or bus purchase is economical without incentives. Incentives also have a critical, parallel role in increasing consumer acceptance to ensure a willing market for this next generation of vehicles as technology costs decline.

Over the next several years, increasing annual investments in HVIP will be needed to continue encouraging early deployment of advanced technology vehicles, such as zero-emission delivery trucks and transit buses, and encourage technology advances in heavier truck sectors. These investments will be structured to encourage increasing HVIP participation among smaller California fleets, and with benefits to disadvantaged communities.

Because the HVIP program is evolving, there continues to be a need to evaluate the effectiveness of program investments. Staff believes metrics of hybrid and zero-emission truck and bus market success can eventually help identify when specific heavy-duty vehicle technologies become self-sustaining. Potential metrics could include:

- Number of hybrid (or battery electric) trucks sold per vehicle vocation.
- Number and types of battery electric buses sold per vocation (e.g., transit, school bus, airport shuttle, etc.).
- Hybrid powertrains sold per manufacturer.
- Manufacturer diversity.
- Declining vehicle incremental cost.
- Number of offerings in different vocational applications.
- Number of vehicles sold in states without public incentives.

These metrics are unlikely to drive a decision to sunset funding for hybrid or zero-emission trucks or buses in the near term. Instead, such a decision will be driven more by desire to promote purchase of a new, even cleaner available technology. This could take the form of phasing out basic hybrid truck eligibility in favor of new commercially available plug-in hybrids. Possible metrics of market health will continue to be developed as more technologies enter the market and will be discussed in depth with stakeholders in future work group meetings.

# **Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley**

Proposed AQIP Allocation – \$3 million
--

## **PROJECT OVERVIEW**

Emissions from mobile off-road agricultural equipment are among a number of significant sources of air pollution in the San Joaquin Valley. Incentive programs and regulations are already reducing emissions from a wide variety of diesel engines in the region; however, a continuing transition to the cleanest technologies is needed to meet federal ozone standards in 2023 and 2032. ARB staff proposes continuing its commitment to the Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley (Trade-Up Pilot Project), first introduced in the FY 2015-16 funding cycle.

The Trade-Up Pilot Project provides ARB an opportunity to evaluate the feasibility of a new incentive model for mobile agricultural equipment, intended for owners of high-emitting equipment that are not well served by existing incentive programs which only provide funding for new equipment purchases. The trade-up concept is a two-step transaction in which the owner of equipment with a Tier 0 (uncertified) or Tier 1 certified diesel engine agrees to scrap that equipment in exchange for a previously used and reconditioned piece of equipment with a certified Tier 2 or Tier 3 engine at little or no out-of-pocket cost. This used equipment comes from another owner that relinquishes it for an incentive to purchase brand new equipment that employs the cleanest engine technology (Tier 4 Interim or Tier 4 Final certification).

## **CURRENT PROJECT STATUS**

In FY 2015-16, ARB allocated \$500,000 in AQIP funds to launch the Trade-Up Pilot Project. ARB has selected the San Joaquin Valley APCD, via competitive solicitation, to administer the project. Project goals include determining the project's cost-effectiveness; developing implementation guidelines that would enable emission reductions resulting from trade-up transactions to be creditable under the State Implementation Plan (SIP); and assessing the owner/user experience and acceptance of incentivized equipment. Project launch is targeted for the summer 2016.

## **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes allocating \$3 million for the Trade-Up Pilot Project, building upon the FY 2015-16 project. The proposed allocation would enable testing the feasibility of the trade-up concept at a larger scale, including streamlining methods for matching eligible growers with eligible equipment. An incrementally larger project is a logical and crucial next step in evaluating the viability of a trade-up program as a potentially new incentive type San Joaquin Valley-wide. An expanded project may also encourage increased participation among San Joaquin Valley mobile agricultural equipment



dealers and equipment manufacturers, resulting in more opportunities for equipment matches and enhanced product choices for project participants.

*Disadvantaged Community Benefits:* While disadvantaged community benefits are not a specific requirement of AQIP funding, the project area encompasses disadvantaged communities and is intended to benefit smaller-acreage and lower-income growers not well served by existing incentives that only cover new equipment purchases.

*Project Solicitation:* ARB will conduct a competitive solicitation to select a grantee to administer the Agricultural Equipment Trade-Up Project in the San Joaquin Valley. Staff will hold public work group meetings following Board approval of the FY 2016-17 Funding Plan and release a competitive solicitation for the full \$3 million funding allocation. The solicitation will contain a match funding requirement and be open to California-based public agencies, which may subcontract with public, private, or California-based non-profit organizations. The solicitation's scope of work and application scoring criteria will be discussed with stakeholders during the work group meetings prior to the release of the solicitation.

## **OUTCOMES**

The proposed allocation for the Agricultural Equipment Trade-Up Pilot Project is expected to fund about 40 to 60 equipment transactions, providing an estimated 190 tons of criteria pollutant emission reductions. Appendix A provides additional details on the emission estimates. Since the project would be funded through AQIP, GHG reductions are not required or quantified. Metrics, such as hours of operation, fuel efficiency, in-field equipment performance, and maintenance will be used to assess the success of the equipment trade-up incentives.

This year's pilot project is a sequential and necessary step in assessing the trade-up concept's potential as a new, mobile agricultural equipment incentive type in the San Joaquin Valley. If viable, staff may recommend expanding the project beyond the pilot stage in future years. This incentive type could complement the existing portfolio of federal, State and local incentives, and meet an unmet need of small farms and lower income growers. Targeting this investment in the San Joaquin Valley aids in accelerating needed adoption of cleaner diesel engine technologies in mobile agricultural equipment and in reducing the legacy fleet of high-emitting equipment in this heavily agricultural, non-attainment air basin.

# Truck Loan Assistance Program

Proposed AQIP Allocation – \$22 million

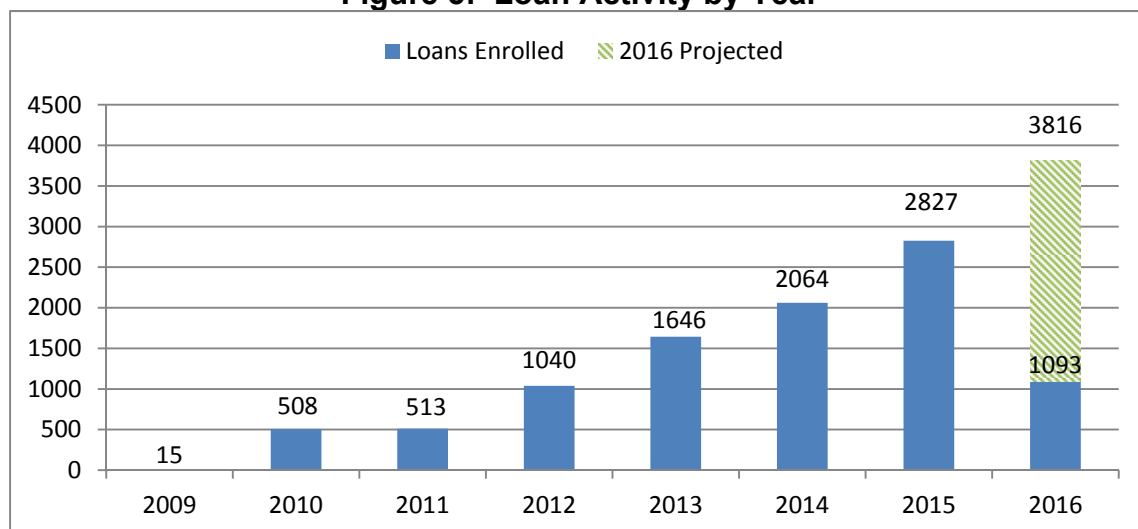
## PROJECT OVERVIEW

Launched in 2009, the Truck Loan Assistance Program utilizes AQIP funds to help small-business fleet owners affected by ARB's In-Use Truck and Bus Regulation to secure financing for upgrading their fleets with newer trucks or with diesel exhaust retrofits. The program is implemented in partnership with the State Treasurer's Office's CPCFA through its California Capital Access Program (CalCAP) and leverages public funding with private funding from participating lending institutions. The program is available for small fleets with 10 or fewer trucks at the time of application. Lenders use their traditional underwriting standards to establish loan terms; however, the program currently includes an interest rate cap of 20 percent. Because the program primarily reduces criteria and toxic air contaminant emissions, AQIP is the only source of ARB funding available for this program.

## CURRENT PROJECT STATUS

As of March 2016, about \$76 million in Truck Loan Assistance Program funding has been expended to provide about \$641 million in financing to small-business truckers for the purchase of approximately 10,700 cleaner trucks, exhaust retrofits, and trailers. Demand by truck owners continues to increase each year as shown in Figure 5. Program expenditures in 2015 were \$20.8 million, a 35 percent increase over 2014. Program growth is driven by increased lender and borrower awareness and utilization of the program, increased cost of new diesel trucks, and increased enforcement of the In-Use Truck and Bus Regulation.

**Figure 5: Loan Activity by Year**



To meet consumer demand, ARB increased the original FY 2015-16 AQIP allocation of \$15 million by \$3 million to ensure that the program would remain fully funded through the rest of the FY 2015-16.

Table 13 provides a summary of financing provided to date. Nearly 60 percent of enrolled loans have been issued to owner operators with one truck, and nearly 95 percent of enrolled loans have been issued to fleet owners with 10 or fewer employees.

**Table 13: Truck Loan Assistance Program Status –Vehicles/Equipment Financed**

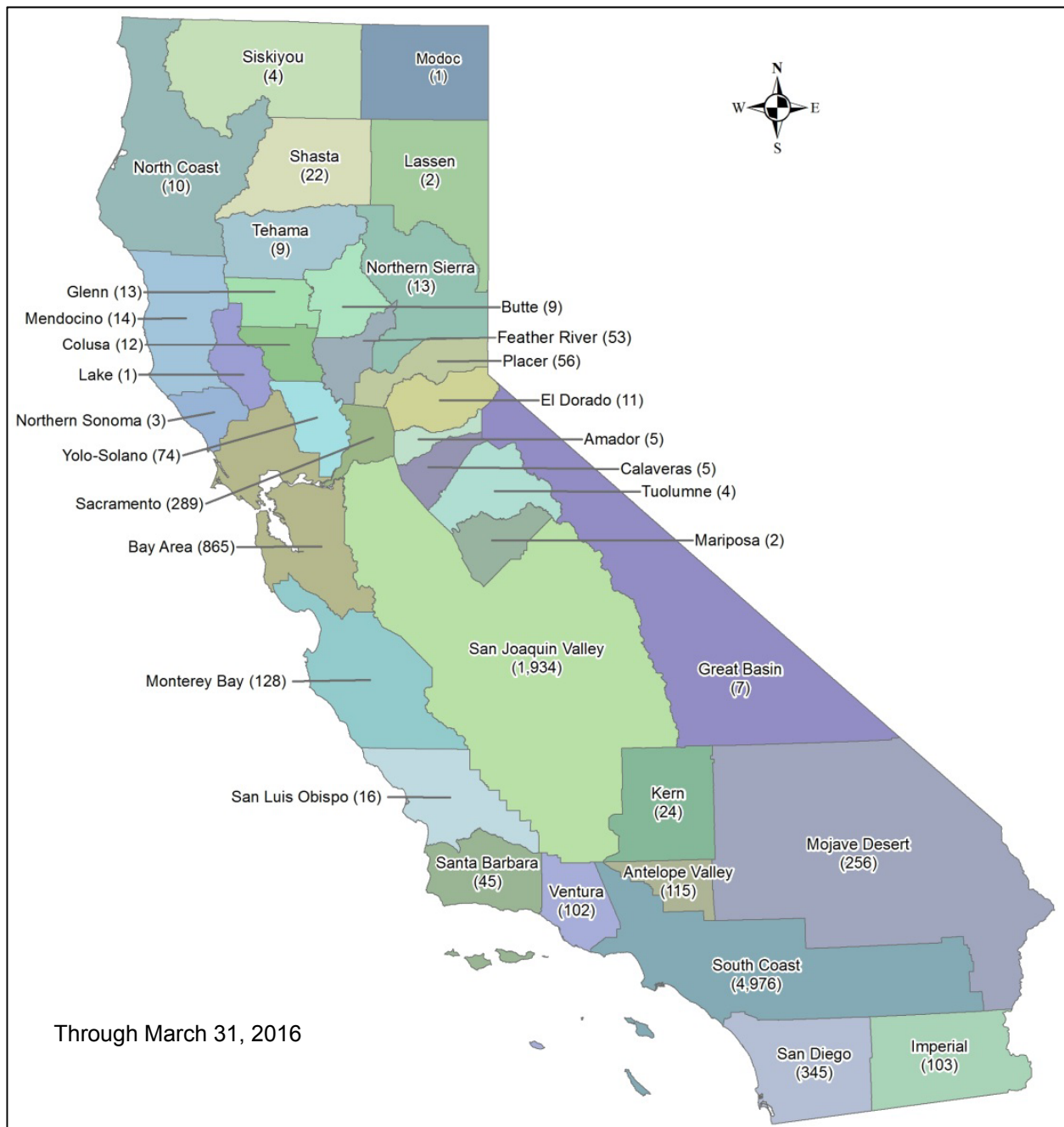
<b>Number of Loans Issued<sup>1</sup></b>	<b>Number of Projects Financed</b>	<b>Project Type</b>	<b>State Funding (millions)</b>	<b>Total Amount Financed (millions)</b>
9,706	9,934	Truck Purchases	\$76	\$641
	594	Exhaust Retrofits		
	141	Trailers		

Based on data through March 31, 2016.

<sup>1</sup>Total number of loans issued does not equal the number of projects financed because some loans included multiple projects.

Figure 6 on the next page shows the number of truck loans issued within each air district through March 2016.

**Figure 6: Truck Loans by Air District**



### **STAFF PROPOSAL FOR FY 2016-17**

ARB staff proposes an allocation of \$22 million from AQIP for the Truck Loan Assistance Program to meet expected demand for the FY 2016-17 cycle. ARB remains committed to meeting the growing demand, as having loan assistance unavailable for even a short period erodes the confidence lenders have in providing the necessary financing to purchase trucks to meet the compliance requirements of the In-Use Truck and Bus Regulation. To ensure the sustainability of the program and continuous

availability of funding to participating lenders, ARB staff is working with CPCFA to examine potential program modifications to address both short- and long-term cash flow and to meet ever-increasing demand. Options under consideration include:

- *Alignment of contribution rates consistent with the State CalCAP Program:* In the coming months, CPCFA will obtain input from lenders on the feasibility of introducing lender and borrower fees to realign the contribution rates to those currently offered under the regular small business program. ARB contribution rates for loan loss reserve accounts have been adjusted as of January 1, 2016. The top tier rate has been reduced from 10 percent to 4 percent. This will improve the leverage of the program and slow the rate of the expenditure of AQIP funding.
- *Incremental recapture of funds in the lenders' loan loss reserve accounts:* CPCFA's analysis has indicated that an annual recapture mechanism is possible for each lender's loan loss reserve account for loans which have matured, or after five years from the date of loan enrollment, whichever comes first. Recapture would not be applicable to the contributions for loans which have defaulted or were charged-off. Any recapture mechanism would have to be adopted through a CPCFA public rulemaking, so the proposed structure or implementation details are subject to input from lenders and stakeholders, and approval from the CPCFA Board.
- *Short-term cash flow:* Because the AQIP revenues accrue throughout the fiscal year, the demand for funding for the Truck Loan Assistance Program may from time-to-time precede the availability of funds to advance to CPCFA. ARB staff will assess whether there are any sources of funding that may be available to cover the temporary lack of funding. The current interagency agreement includes a provision of a \$5 million bridge loan from CPCFA to cover temporary funding needs. The proposed allocation along with recaptured premiums should be enough to cover the potential gap due to temporary lack of AQIP funding which typically occurs at the start of each fiscal year for about three months.

ARB staff will continue to closely monitor program demand and work with CPCFA staff, participating lenders, and other stakeholders to evaluate whether to implement program changes to balance available funding with meeting the needs of the fleets. If changes are warranted, they would be developed and implemented through a public process resulting in an amended interagency agreement between ARB and CPCFA.

*Disadvantaged Community Benefits:* Because the Truck Loan Assistance Program is funded through AQIP, it is not subject to the disadvantaged community investment requirements that accompany Low Carbon Transportation investments. However, it is worth noting much of the Truck Loan Assistance Program funding benefits disadvantaged communities. Over 80 percent of the loans to date have been issued for trucks registered in ZIP codes that are defined as benefiting disadvantaged communities.

## **OUTCOMES**

The proposed allocation for the Truck Loan Assistance Program is expected to fund about 3,900 new truck purchases, meeting expected demand for FY 2016-17 and helping small business truckers comply with the In-Use Truck and Bus Regulation, which would result in an estimated 3,300 tons of criteria pollutant emission reductions. Appendix A provides additional details on the emission estimates.

Staff anticipates that future funding plans will maintain funding for the program to continue to meet the strong demand and support for small-business fleets through the compliance deadlines approved by the Board. Assessments of ongoing funding needs will take into account updated program activity trends, which reflect truck owners' demand for financing assistance, compliance schedules, and noncompliance rates. Because program activity fluctuates based on truckers' participation in the program, ARB staff commits to perform periodic assessments to develop funding projections for annual program needs.

## CHAPTER 5: VERY LOW CARBON FUELS INVESTMENTS

---

Achieving California's air quality and climate change goals will require deploying a combination of regulatory and incentive strategies at the manufacturer, the fleet, and the consumer levels. In this Funding Plan, staff proposes to incentivize a suite of demonstration, pilot, and commercially available vehicle technologies to help support the overarching goals of ARB and the State. ARB staff proposes complementing the projects outlined in the previous chapters of this document, along with those projects proposed by other State agencies, with a project that incentivizes the production and use of very low carbon fuels in the transportation sector.

Incentive programs have already played a vital role in accelerating the transition of on-road and off-road heavy-duty vehicles and equipment to cleaner technology, and they will continue to do so for the foreseeable future. It takes time for technology transfer to happen, and staff recognizes that particularly in the heavy-duty (both on- and off-road) sector, we are just now beginning to see that technology transfer take place. Since these heavy-duty vehicles and equipment have long lifetimes – many of the engines sold today may still be operating in 2030 – investments that bring the cleanest technologies to market as quickly as possible will be essential for achieving our air quality and climate change goals. Lower NO<sub>x</sub> engines, when paired with the use of renewable fuels, could provide near-zero GHG emissions. Parallel development and use of these technologies and fuels should be further encouraged to provide the needed nearer term emission reductions as we encourage the technology transfer needed to achieve long-term reductions. This production incentive, concurrent with investments by other agencies, will be a critical component to transform transportation fuels to cleaner, very low carbon alternatives.

### Policy and Statutory Drivers

There are already an existing suite of regulatory drivers designed to encourage the production of very low carbon transportation fuels, such as the Federal Renewable Fuels Standard (RFS), which was authorized under the Energy Policy Act of 2005 and expanded under the Energy Independence and Security Act of 2007, and ARB's LCFS (pursuant to the goals presented in AB 32 and Governor Schwarzenegger's Executive Order S-01-07). ARB's *Climate Change Scoping Plan* specifically recognizes the importance of reducing the carbon content of fuels and providing market support to get these very low carbon fuels into the marketplace as one part of a multi-pronged approach designed to help achieve California's long-term air quality and climate change goals.

ARB's LCFS is designed to promote the use of low carbon transportation fuels. The LCFS is intended to foster innovation in the fuels markets to encourage the development of the next generation of low carbon fuels used in California through the use of a declining carbon intensity standard. One aspect of this is the use of a

market-based credit trading system that allows fuel producers to decide how best to reduce emissions. The LCFS seeks to achieve a ten percent reduction in the carbon intensity of transportation fuels used in California by 2020.

The *Mobile Source Strategy* points out that continued early investments and incentives to accelerate deployment of zero- and near zero-emission technologies in the heavy-duty sector are going to be needed to meet our air quality and climate goals. With the Governor's goal of reducing petroleum use by 50 percent by 2030, the Strategy calls for the use of cleaner, lower carbon fuels over time. It specifically includes a measure concept to develop a low-NOx, low-PM, low carbon intensity (LPNC) diesel standard that would require progress towards a goal of a 50 percent LPNC diesel share of all diesel fuel sold by 2030.

At the federal level, Congress established the RFS program in 2005. The RFS was then further expanded into what is known as RFS2 under The Energy Independence and Security Act of 2007. The RFS program requires a certain volume of renewable fuel to replace or reduce the quantity of petroleum-based transportation fuel, heating oil or jet fuel. The RFS includes four renewable fuel categories: biomass-based diesel, cellulosic biofuel, advanced biofuel, and total renewable fuel. Under RFS2, the size of the program was significantly increased, and key changes such as boosting the long-term goals to 36 billion gallons of renewable fuel and extending yearly volume requirements out to 2022 were included.

In spite of all this policy support, the economic viability of alternative fuels projects still continues to be tested by a variety of market and policy drivers. These drivers include a reduction in the RFS volume obligations at the national level, unresponsive investors in the face of temporary production tax credits, higher-than-anticipated costs of agricultural residues and waste feedstock, and especially low oil prices.

Some economic experts have commented that a long term "per gallon" subsidy may be more critical and cost effective at both maintaining existing levels of production and stimulating new investment. This Very Low Carbon Fuels Incentive Project is intended to incentivize the production of the fuels that will help California to achieve these targets and goals.

## **Complementary Incentive Funding Programs**

California has a number of different, but complementary, incentive programs aimed at developing and deploying advanced technologies, fuels, and infrastructure for the transportation sector. As incentive funding continues to evolve, the State can help focus and prioritize spending to encourage development and demonstration of innovative technologies in new applications, support pilot programs to further advance promising applications, and incentivize the early commercialization of advanced technologies that have a remaining incremental cost that the market will not directly bear. Some of the State and other complementary incentive funding programs include:



**California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program** provides about \$100 million annually through 2024 to develop and deploy alternative and renewable fuels and advanced transportation technologies to help achieve the state's climate change goals. This program was created through AB 118 (2007), which authorizes the Energy Commission to utilize public funding to catalyze the development and deployment of innovative technologies aimed at transforming California's fuel and vehicle types away from petroleum use. Additionally, AB 8 (2013) reauthorized the program, extending the AB 118 clean fuel and vehicle programs as well as local air district funds for diesel emission reduction through 2023. To date, the Energy Commission has awarded over \$500 million for biofuel production, alternative fueling infrastructure, advanced vehicle demonstration and deployment, vehicle and component manufacturing, and workforce training.

**Federal Funding:** There is also considerable investment in advanced transportation at the federal level. For example, there are federal programs to spur biofuel (\$181 million in 2013 from the U.S. Department of Agriculture) and zero-emission technology development (\$45 million in 2013).

**Other Complementary Programs:** There are several other State programs that, while primarily intended to accomplish other related goals, can also help to bring about GHG reductions from transportation. Both CalRecycle and the California Department of Food and Agriculture offer funding programs that are specifically designed for other purposes, such as the capture of methane from landfills and dairy manure. Some of the facilities funded under these programs may also serve to produce low carbon fuels for the transportation sector.

## Very Low Carbon Fuels Incentives

Proposed Low Carbon Transportation allocation – \$40 million
--

### **PROJECT OVERVIEW**

The Governor's proposed FY 2016-17 State Budget includes \$40 million in incentive funding for the production of very low carbon, renewable transportation fuels as part of \$500 million in overall funding for Low Carbon Transportation and Fuels Investments.

This funding will be limited to renewable fuels that are produced in California and would be further limited to those fuels which meet a designated carbon intensity threshold. The ARB staff proposal also provides the option for additional incentives for the production of fuels that use in-state feedstock as well as for fuels that provide a disadvantaged communities benefit. Goals of this funding include:

- Increasing the volume of very low carbon fuels produced and used in California.
- Reducing GHG emissions and, to the greatest extent possible, also reducing the criteria pollutants and air toxics emissions associated with fuels.
- Helping accelerate the transition to the use of very low carbon fuels needed to meet California's long-term climate goals.
- Fulfilling related goals, such as the collection and diversion of waste, and the capture and use of biomethane from landfills, sewage treatment plants and dairy digesters.
- Supporting vehicles and equipment that do not yet have zero-emission technology options.

### **STAFF PROPOSAL FOR FY 2016-17**

As a new project category, staff proposes \$40 million in total for incentives for the production of very low carbon fuels in California. These incentives are intended to encourage increased production of these fuels, and the incentive would be designed to complement incentive programs administered by other agencies, such as the Energy Commission, the California Department of Food and Agriculture, and CalRecycle.

Under ARB staff's proposed approach, in-state producers of very low carbon fuels would be eligible for a base "per gallon" subsidy if the carbon intensity of the fuel meets a defined carbon intensity threshold. These fuels would be eligible for a further "per gallon" subsidy if they are sourced from feedstock produced in-state, and they would also be eligible for a further "per gallon" subsidy if they include a disadvantaged communities component. The rate of the base subsidy for a given fuel will correspond to the carbon intensity of the fuel pathway, with lower carbon intensity fuels earning a higher per gallon subsidy. This promotes diversity in the fuel pool in California and complements other agency funding efforts, such as the Energy Commission's role in funding infrastructure and production facilities.

**Proposed Eligibility Requirements:** Eligibility would be limited to fuels that are produced in-state. This supports the requirement that expenditures from the GGFR must reduce GHG emissions in California (Health and Safety Code section 39712(b)) and to the extent feasible support development of the green economy (Health and Safety Code section 39712(b)(2)).

Eligibility would also be limited to fuels that have a provisional or certified fuel pathway (such as under the LCFS regulation). This ensures that reductions in the fuel production chain are real, and includes emissions from well-to-wheels.

Fuels would need to have a carbon intensity no greater than 40 percent of the petroleum based fuels that they are replacing as shown in Table 14. This is consistent with the definition of very low carbon fuels as stated in AB 692 (Quirk, Chapter 588, Statutes of 2015). Adhering to this definition and using this carbon intensity threshold will help to encourage production of the lowest carbon fuels.

**Table 14: Carbon Intensity Standards and Targets (as of 2016)**

<b>Fossil Fuel</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>	<b>40% Carbon Intensity Target</b>
Gasoline	96.50	38.60
Diesel	99.97	39.99

**Proposed Incentive Amounts:** The base production incentive will be determined by the carbon intensity of the fuel pathway. Proposed per gallon incentive amounts are shown in Table 15. Additional incentives would be available for fuels sourced with in-state feedstocks. The increased use of in-state feedstocks is important in helping to achieve our overall GHG reductions through minimizing transportation, diverting waste materials, and capturing methane. Additional incentives would also be available for benefitting disadvantaged communities and addressing an important community need. During the development process, community groups expressed their interest in having a disadvantaged community component to this project.

**Table 15: Per Gallon Incentive Amounts**

<b>Carbon Intensity**</b>	<b>Base Incentive (\$/GGE*)</b>	<b>Additional Incentives (\$/GGE)</b>		<b>Total Potential Incentive (\$/GGE)</b>
		<b>In-State Feedstock</b>	<b>Disadvantaged Communities</b>	
<b>0 or less</b>	\$0.50	\$0.20	\$0.20	Up to \$0.90
<b>0.01 – 20.00</b>	\$0.20	\$0.20	\$0.20	Up to \$0.60
<b>20.01 – 39.99</b>	\$0.10	\$0.10	\$0.10	Up to \$0.30

\*Gasoline Gallon Equivalent

\*\*Eligibility for base incentive is dependent on meeting the following requirements:

- The fuel is produced in California.
- The fuel pathway has been certified.
- The carbon intensity of the fuel pathway is no more than 60 percent of the carbon intensity of the comparable petroleum based fuel.

**Disadvantaged Community Benefits:** Staff is proposing that there be an additional incentive for very low carbon fuels that benefit disadvantaged communities. Because

this will be a new program, ARB will work with stakeholders and community members, in a public process, to establish the criteria that will determine whether a project qualifies as benefiting a disadvantaged community. This public process will also include the development of reporting requirements that grantees will use to document project benefits.

*Incentive Cap:* Staff is proposing the inclusion of an incentive cap. This concept could take the form of a facility-level cap, a producer-level cap, or a fuel-type cap. The purpose of the cap would be to ensure that no single facility, producer, or fuel-type ends up taking a disproportionate share of the incentive funding, and it would also help to ensure that funding is preserved for new fuel facilities about to begin production. Staff will be developing the mechanism for implementing the incentive cap through a subsequent work group process.

*Project Administration:* Staff anticipates that this project will be treated as a new, standalone project. Under this proposal, eligible producers of very low carbon fuels would submit evidence that they have produced and delivered the fuel. Once this information has been evaluated and confirmed by staff, the producers would enter into a written agreement with ARB, allowing ARB to disburse the funds to the producers on a first-come, first-served basis. Staff will be developing the details regarding the project administration process and award of incentive funds through a subsequent work group process and recommends that the Board delegate to the Executive Officer the authority to finalize the details after the completion of that process.

## **OUTCOMES**

Staff believes this project will incentivize the production of approximately 67 million GGE of renewable very low carbon transportation fuels, at about \$0.60 per GGE, and resulting in a reduction of nearly 420,000 metric tons of CO<sub>2</sub> equivalent GHG emission reductions.

While ARB's intention for the first year of this project is to develop and implement a relatively simple approach to provide incentives for the production of very low carbon fuels in California, staff will continue to monitor the project, consult with stakeholders, and make recommendations for potential changes in subsequent years for as long as the project continues.

Looking forward, staff believes that this project can help to assist in both increasing the volumes of very low carbon transportation fuel being produced, and leading to the development and production of fuels with lower carbon intensities. At the same time, staff has heard a consistent message from stakeholders about the need for a more long-term program that offers reliable, annual funding support to reduce some of the investment risk associated with the production of low carbon transportation fuels. The lack of long-term stable pricing presents a challenge to expanding the volume of low carbon fuels produced. Uncertainty about the federal RFS, unpredictability in LCFS prices, and low petroleum prices all contribute to instability in the low carbon fuels

market. One approach that has been suggested is to set up a program that would look at the total market value of the fuels and contracting with fuel producers to guarantee a minimum floor price for a certain financeable term length (e.g. up to 10 years), taking into account the price for producing the fuel, in addition to the value of existing credits (i.e. RINS, LCFS credits, cellulosic tax credit, etc.). A structure like this would help to attract more private capital to California-based projects by mitigating the revenue risk concerns of the investment community. Structuring the program in the form of a guarantee would also ensure that funds would only be expended when necessary to compensate for weak market conditions or incentive program shortfalls. Until a longer-term program can be implemented, proceeding with the proposed per/gallon incentive approach should help to stabilize the prices of and market for very low carbon fuels as well as help to support the production and purchase of vehicles that use the fuels.

## CHAPTER 6: MAXIMIZING DISADVANTAGED COMMUNITY BENEFITS FOR LOW CARBON TRANSPORTATION AND FUELS INVESTMENTS

---

ARB's 2015 *Cap-and-Trade Auction Proceeds Funding Guidelines for Agencies that Administer California Climate Investments* (California Climate Investments Guidelines) establish requirements and recommendations for maximizing disadvantaged community benefits.<sup>22</sup> This chapter summarizes the steps ARB staff is taking to meet these requirements for the proposed FY 2016-17 Low Carbon Transportation and Fuels appropriation.

The California Climate Investments Guidelines lists a number of requirements for State agencies. These requirements are summarized below, along with the actions ARB is taking to address them.

Requirement: Evaluate investments to see if they could potentially result in benefits for disadvantaged communities, using the criteria contained in Appendix 2.A (of the California Climate Investments Guidelines).

ARB Action: ARB staff expected that every project funded with the FY 2016-17 Low Carbon Transportation and Fuels appropriation will provide some benefit for disadvantaged communities. The project category descriptions included in Chapters 3, 4, and 5 of this Funding Plan describe the percentage of each project's funding the staff expects will benefit disadvantaged communities. For each project, ARB staff will use the criteria in Appendix 2.A of the Climate Change Investment Guidelines to evaluate the disadvantaged community benefits and to develop project solicitation and grant requirements. As project funds are expended, ARB will report the disadvantaged communities benefits in future Annual Reports to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds.

Requirement: Target funding, to the extent feasible, for projects that benefit disadvantaged communities and where possible, target projects physically located within disadvantaged community census tracts.

ARB Action: The FY 2016-17 Funding Plan includes a mix of projects that are available statewide on a first-come, first-served basis and those that are limited to benefiting disadvantaged communities (or a portion of the project funding is limited to projects that benefit disadvantaged communities).

---

<sup>22</sup>See Climate Changes Investments Guidelines, Volume II, Chapter V: Guidance on Maximizing Benefits to Disadvantage Communities (pages 2-9 through 2-19 and Appendix 2.A)  
<http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/arb-funding-guidelines-for-ca-climate-investments.pdf>

- As a way to maximize disadvantaged community benefits, ARB staff is proposing that 100 percent of the funding for the Light-Duty Pilot Projects and Advanced Technology Demonstration Projects categories benefit disadvantaged communities.
- For the Zero-Emission Truck Pilot Commercial Deployment Project and the Zero-Emission Bus Pilot Commercial Project, ARB staff included in the solicitation scoring criteria extra points for those projects that demonstrate that they are located in or provide benefits to disadvantaged communities as a way to encourage funding applicants to design their potential projects to benefit disadvantaged communities.
- For the statewide first-come, first-served projects (CVRP and HVIP), ARB staff has incorporated project criteria intended to increase benefits to disadvantaged communities and lower-income consumers. For HVIP, zero-emission truck and bus voucher amounts are higher for vehicles that operate in disadvantaged communities. For CVRP, rebate amounts are higher for lower-income vehicle purchasers with household incomes less than 300 percent of the federal poverty level.

Requirement: Implement outreach to disadvantaged communities.

ARB action: ARB staff is taking several steps to outreach to disadvantaged communities.

- As a part of project solicitations, ARB requires that applicants provide information on how they will outreach to disadvantaged communities, and their applications are scored in part on the quality of the outreach proposal. Efforts to expand disadvantaged community outreach for CVRP are described in more detail in Chapter 3 of the Funding Plan.
- ARB has hired a dedicated staff person to assist with disadvantaged community outreach on Low Carbon Transportation and Fuels investments and help ensure these communities are aware of funding opportunities. With these additional resources, ARB has started an enhanced outreach/education program to maximize the benefits of Low Carbon Transportation and Fuels investments in disadvantaged communities. An important part of the effort is dedicated to assessing the needs of the communities and identifying ways to maximize their benefits from the Low Carbon Transportation and Fuels investments. ARB is partnering with stakeholders, such as community based organizations, community advocates, and environmental justice groups to conduct community meetings aimed at explaining available incentives and increasing the community's ability and willingness to use the programs.

ARB staff is working with liaisons from State agencies receiving Cap-and-Trade auction proceeds to better share information at community

events, so citizens can have access to all relevant California Climate Investments opportunities.

ARB is also developing a comprehensive, but user-friendly website to promote its Low Carbon Transportation and Fuels projects and increase awareness among the community members for related services/assistance available in their ZIP code.

Requirement: Track and report on the disadvantaged community benefits of each investment.

ARB action: All ARB grant agreements with funding recipients require grantees to collect and report to ARB all data necessary to document disadvantaged community benefits. This includes all information necessary to complete the evaluations specified in Appendix 2.A of the California Climate Investments Guidelines (Criteria for Evaluating Benefits to Disadvantaged Communities by Project Type) and the data required in Volume 3 of the California Climate Investments Guidelines (Reporting Requirements).

ARB staff uses this information to provide input for the *Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Proceeds* including the amount of Low Carbon Transportation funding invested in and benefiting disadvantaged communities by project.

Requirement: To the maximum extent possible, investments should result in benefits that meaningfully address an important community need. Table 2-2 of the California Climate Investments Guidelines provides a list of common needs identified by community advocates during the development of the guidelines. Letters of community support can also be used to document that investments address a community need.

ARB action: ARB staff reviewed Table 2-2 of the California Climate Investments Guidelines and determined that the proposed FY 2016-17 Low Carbon Transportation and Fuels investments meet the following common needs of disadvantaged communities shown in Table 16.



**Table 16: Common Needs of Disadvantaged Communities Addressed by Proposed Low Carbon Transportation and Fuels Investments**

Public Health and Safety, Need 1	<p>Reduce health harms suffered disproportionately by low-income residents/communities due to air pollutants.</p> <p><i>All Low Carbon Transportation and Fuels projects meet this need. A portion of funding from all projects is expected to benefit disadvantaged communities as shown in Table 3 (in Chapter 2 of the Funding Plan), and all these projects reduce criteria air pollutants and/or toxic air contaminants as co-benefits thereby reducing health harms due to air pollutants.</i></p>
Economic, Need 5	<p>Reduce transportation costs and improve access to public transportation.</p> <p><i>The Low Carbon Transportation and Fuels projects which provide consumer incentives for more fuel efficient vehicles meet this need. These include CVRP, EFMP Plus-Up, Financing Assistance for Lower-Income Consumers, and Car Sharing and Mobility Options projects.</i></p>
Environmental, Need 1	<p>Reduce exposure to local environmental contaminants, such as toxic air contaminants, criteria air pollutants, and drinking water contaminants.</p> <p><i>All Low Carbon Transportation and Fuels projects meet this need because all projects reduce criteria air pollutants and/or toxic air contaminants as co-benefits.</i></p>
Environmental, Need 2	<p>Prioritize zero-emission vehicle projects for areas with high diesel air pollution.</p> <p><i>The Low Carbon Transportation and Fuels projects which provide incentives for zero-emission vehicles to replace diesel vehicles meet this need. These include the Zero-Emission Freight Equipment Pilot Commercial Deployment Project, Zero-Emission Truck Pilot Commercial Deployment Project, Zero-Emission Bus Pilot Commercial Deployment Project, and Advanced Technology Demonstration Projects.</i></p>

Letters of community support can also be used to document that investments address a community need. During the development of the FY 2016-17 Funding Plan, ARB has received comment letters from organizations representing several community groups voicing support for ARB staff's proposed investments in light-duty pilot projects to benefit disadvantaged communities, financing assistance projects for lower-income consumers, the proposal to direct the bulk of the heavy-duty and freight demonstration and pilot project funding to benefit disadvantaged communities, and the change to CVRP to provide higher rebates to lower-income consumers. ARB has also received verbal comments from community groups advocating for a disadvantaged community component to the new very low carbon fuels incentive project.

In addition to the requirements summarized above, California Climate Investments Guidelines lists a number of recommended strategies for State agencies. Some of these strategies are listed in Figure 8 (excerpted from the Climate Change Investment Guidelines):

**Figure 8: Examples of Strategies for Maximizing Disadvantaged Community Benefits<sup>23</sup>**

<b>Program Design</b>	<ul style="list-style-type: none"> <li>• Set aside a portion of funding for projects with benefits</li> <li>• Create a program where all projects must provide benefits</li> <li>• Offer higher incentive amounts if project provides benefits</li> <li>• Require that projects be designed to avoid substantial burdens</li> </ul>
<b>Competitive Solicitations</b>	<p>Prioritize or award extra points for projects that:</p> <ul style="list-style-type: none"> <li>• Meaningfully address an important community need</li> <li>• Provide multiple co-benefits</li> <li>• Meet multiple criteria in Appendix 2.A</li> <li>• Are located in jurisdictions with anti-displacement policies</li> </ul>
<b>Outreach</b>	<ul style="list-style-type: none"> <li>• Provide assistance for community residents and increase their access to GGRF programs and funding opportunities</li> <li>• Start outreach early and use a variety of approaches (public meetings, List Serves, social media, workgroups)</li> <li>• Improve accessibility of outreach for community members through scheduling and location choices, and translation.</li> </ul>

The FY 2016-17 Funding Plan utilizes a number of these strategies, including:

- Set aside a portion of funding for projects which benefit disadvantaged communities: Funding for Light-Duty Pilot Projects to Benefit Disadvantaged Communities and Advanced Technology Demonstrations is limited to projects that benefit disadvantaged communities.
- Offer higher incentive amounts if project provides benefits to disadvantaged communities: HVIP provides higher voucher amounts for zero-emission trucks and buses that operate in disadvantaged communities. In addition, CVRP provides higher rebate amounts to lower-income consumers (though these increased rebates are not limited strictly to those lower-income consumers living in disadvantaged communities).
- Prioritize or award extra points for projects that meaningfully address an important community need: In the 2016 competitive solicitation for Zero-Emission Truck and Bus Pilot Commercial Deployment Projects, the scoring criteria provided extra points for those projects that demonstrate that they are located in or provide benefits to disadvantaged communities. Staff has proposed that funding in the Zero-Emission Truck Pilot Commercial Deployment Project and Zero-Emission Bus Pilot Commercial Deployment Project categories be awarded to the highest-scoring remaining projects from that competitive solicitation.
- Provide multiple co-benefits: Low Carbon Transportation and Fuels co-benefits include reducing criteria pollutant and toxic air contaminant emissions, reducing

<sup>23</sup>See Figure 2-2, on page 2-15 of the Climate Investments Guidelines.

fuel costs, and improving lower-income consumers' access to low carbon transportation.

- Provide assistance for community residents and increase their access to GGRF programs and funding opportunities: ARB includes outreach as a component of its grant agreements. As noted earlier in this chapter, ARB has also hired a dedicated staff person to assist with disadvantaged community outreach on Low Carbon Transportation and Fuels investments and help ensure these communities are aware of funding opportunities.
- Start outreach early and use a variety of approaches: ARB staff started the Funding Plan development process in December 2015, six months prior to Board consideration of the plan. ARB staff held three public workshops and a total of 15 public workgroup meetings on the Funding Plan. A list of these meetings is provided in Table 6 (in Chapter 2 of this document). ARB staff also met individually with groups that requested meetings.

## CHAPTER 7: CONTINGENCY PROVISIONS

---

The proposed FY 2016-17 Funding Plan is based upon the latest available information. However, circumstances may change between the time the proposed Funding Plan is released for public comment and when the Board approves the Funding Plan, project solicitations are issued, project funds awarded, or as projects are implemented. This section describes staff's proposed contingency plans should mid-course corrections be needed to ensure that funds are spent expeditiously, efficiently, and where the need is the greatest. Under these provisions, the Board would grant the Executive Officer authority to make mid-course adjustments as necessary.

Low Carbon Transportation and Fuels Appropriation: The proposed Funding Plan includes allocations for Low Carbon Transportation and Fuels investments, based on the Governor's State Budget proposal, as revised in May 2016. The final State Budget has not been approved and signed at the time this proposed Funding Plan was released. If the final State Budget authorizes an amount different than the \$500 million proposal, staff would present proposed modifications to address those changes at the June 23, 2016 Board meeting provided that the State Budget is signed by the Governor before the Board meeting date. The Board would consider those modifications as part of its consideration of the Funding Plan.

If there are further changes to the Low Carbon Transportation and Fuels appropriation after the Board meeting, staff proposes to allocate the funding as follows unless otherwise specifically directed by the Board or legislation:

- For an appropriation less than the \$500 million in the Governor's proposed State Budget, ARB would scale funding allocations down proportionately for each project.
- For an appropriation exceeding the \$500 million in the Governor's proposed State Budget, ARB would direct any additional funding up to \$50 million to the next highest-scoring applications received in response to the FY 2014-15 Multi Source Facility Demonstration Project solicitation and the next highest-scoring bus applications received in response to the combined FY 2014-15 and FY 2015-16 Truck and Bus Pilot Commercial Deployment Projects solicitation with an equal funding amount to each category.
- For an additional funding amount above \$50 million, ARB would allocate 25 percent of the available funding to light-duty vehicle projects and 75 percent of the funding to heavy-duty vehicle and off-road equipment projects. The light-duty vehicles funding would be allocated to the Light-Duty Pilot Projects to Benefit Disadvantaged Communities or Financing Assistance for Lower-Income Consumers project categories based on documented need such as over subscription to a solicitation or consumer demand exceeding available funding for projects such as EFMP Plus-up. The heavy-duty vehicle and off-road equipment project funding would be allocated first to fulfill remaining demand for

multi-source demonstration and bus pilot projects listed above and then to the other heavy-duty vehicle and off-road equipment project categories based on documented need such as over-subscription to a solicitation or demand exceeding available funding.

AQIP Funding Levels: Over past funding cycles, AQIP revenues were sometimes lower than the levels included in the State Budget, and project solicitations had to be scaled back. AQIP appropriation levels have been adjusted in the State Budget in recent years to more closely track anticipated revenues, so staff does not expect needing to scale back AQIP funding in the FY 2016-17 funding cycle. However, staff is proposing to leave \$3.6 million of the AQIP appropriation unallocated to function as a prudent reserve. As noted in Chapter 2, staff proposes the following contingency provisions specifying how the \$3.6 million in reserve funds would be allocated if revenues are sufficient. As a first priority, the additional funding would be allocated to either of the two AQIP-funded projects if there is demonstrated demand. As a second priority, funding could be allocated to research related to the mobile source emission categories covered in the Funding Plan if there are still remaining funds available.

Additional Funding Sources: If funding from other sources is provided for any of the project categories authorized in the Funding Plan, these outside funds will be allocated as needed for projects or as specifically required by the authorizing entity. Additionally, projects receiving additional funding may be altered to accommodate any conditions placed upon the use of alternative sources of funding as long as these conditions are consistent with the statutory provisions for Low Carbon Transportation and Fuels investments and AQIP. ARB staff will consult with project work groups prior to making any changes to projects.

Project Demand: ARB staff plans to issue initial solicitations and funding agreements based on the allocations listed in Tables 3 and 5 (Chapter 2). However, these solicitations and grant agreements will be written with provisions to allow an increase in awarded funding if there are sufficient revenues and project demand. Conversely, staff proposes that the Executive Officer have the ability to reallocate funding from any project in the event that demand does not materialize or if he determines that the project is not viable as envisioned in the Funding Plan (e.g. a technology considered for demonstration or pilot deployment is not ready to be funded). In this case, funds would be preferentially reallocated within the same project category or sector prior to reallocating to a different sector. For example, if demand fails to materialize for one of the truck projects, ARB would first prioritize reallocating that funding to other truck projects. Likewise, if demand falls short for one of the light-duty pilot projects, ARB would shift that funding to another light-duty pilot. Any changes in funding for a particular project category would be publicly vetted through public project work groups.

When ARB is evaluating solicitations, there may be cases where funding has been awarded to the highest scoring applications and the remaining available funds are less than the amount requested in the next highest scoring application. In these cases, staff proposes that the Executive Officer have the authority to offer funding to the next

highest scoring project(s) at a scaled down scope, carry the remaining funds forward to the next fiscal year, or shift the funds to another project category at his discretion.

Finally, staff proposes the Executive Officer have the authority to establish consumer waiting lists for CVRP, HVIP, Public Fleet Pilot, or Low NOx Engine Incentives in the event funding is exhausted prior to the end of the funding cycle.

Minor Technical or Administrative Changes: The proposed Funding Plan specifies all policy-related details regarding the projects to be funded. However, technical or administrative changes in implementation procedures may be needed from time to time to ensure these projects are successful. Staff proposes a transparent process in which minor changes to a project category would be publicly vetted through the public project work groups that have been established to discuss the implementation details of each project. For several project categories, staff is already planning to use the public work group process to finalize technical details prior to issuing solicitations. These changes would be within the Funding Plan parameters approved by the Board.

**PART II:**  
**LONG-TERM PLAN FOR CVRP AND LIGHT-DUTY**  
**VEHICLE INCENTIVES**

## Overview

The California clean car market has grown rapidly over the past few years, along with the need for continued and expanded incentives to ensure long-term market success. Over the past several funding cycles, ARB has directed significant funding toward light-duty vehicle incentives, primarily through CVRP. Because of this, policy makers continue to inquire about the cost-effectiveness, equity, financial sustainability, and structure of these incentive programs. More specifically, the Legislature and the Board have expressed interest in understanding when a self-sustaining ZEV market is expected and what steps can be taken to ensure incentives are phased out appropriately. In response to these requests, ARB staff has spent the past two years reviewing relevant literature and evaluating available vehicle and market data. ARB has also sponsored external research projects in these areas to address these needs. Throughout the development of the FY 2016-17 Funding Plan, ARB staff also engaged stakeholders in public workshops and a series of public work groups to better define the task and refine the work undertaken. The resulting Long-Term Plan for CVRP and Light-Duty Vehicle Incentives is intended to serve as a foundational framework for future decision-making related to light-duty incentives policy.

The advanced technology clean vehicle market is still in its infancy. Only about five years of vehicle sales data for ZEVs and PHEVs is available, and while the market is growing impressively, these vehicles collectively only made up about 3.1 percent of new car sales in 2015.<sup>24</sup> Predicting how this market will grow over the next several years is challenging. However, ARB staff has identified several possible market indicators and a plan for continued evaluation and annual updates to inform the Board moving forward.

Specifically, ARB staff recommends evaluating the market based on ZEV sales in comparison to the comparable California new car market as a measure of market sustainability. Using this approach, staff believes that the ZEV market won't be sustainable without broad purchase incentives for at least the next five to ten years. Focused financial incentives, or other types of incentives may still be necessary beyond that point. Staff recommends an approach for ramping down the current purchase incentive over time based both on expected market sustainability and budgetary constraints, and suggests maintaining the primary current incentive structure at least for the next several years.

## Statutory Goals and Requirements

SB 1275, signed into law in 2014, establishes the Charge Ahead California Initiative with the goals of placing one million zero-emission and near zero-emission vehicles in California by 2023 to establish a self-sustaining market and increasing access to these vehicles for lower-income consumers and consumers in disadvantaged communities. Among other requirements, SB 1275 requires ARB to include a long-term plan for CVRP and related programs in the FY 2016-17 Funding Plan. The plan must include:

---

<sup>24</sup><http://www.cncda.org/CMS/Pubs/Cal%20Covering%204Q%2015.pdf>



- A three-year forecast of funding needs to support the goals of technology advancement, market readiness, and consumer acceptance of advanced vehicle technologies. Acknowledging the uncertainty in forecasting a dynamic market over an extended period, SB 1275 states that this forecast may be described as a range with high and low funding levels. The three-year forecast will cover the period between July 1, 2016 and June 30, 2019.
- A market and technology assessment for each funded vehicle technology (battery electric, plug-in hybrid, and fuel cell) to inform the appropriate funding level, incentive type, and incentive amount.
- An assessment of when a self-sustaining market is expected and how existing incentives may be modified to recognize expected changes in future market conditions.

## Three-Year Forecast of Funding Needs

As required by SB 1275, ARB staff, in consultation with CSE, the CVRP administrator, developed three-year funding projections for light-duty investments including both CVRP and light-duty pilot projects. ARB staff held a series of public work group meetings to discuss projections developed by staff and external stakeholders.

Based on the projections developed for CVRP and the light-duty pilot projects, the estimated funding need is shown in Table 17. Projection approaches are described in further detail.

**Table 17: Light-Duty Project Projections**

Fiscal Year	Estimated Funding Need (millions)				
	All LD Projects	Low		High	
		CVRP	LD Pilots	CVRP	LD Pilots
<b>FY 2016-17</b>	<b>\$210 - \$240</b>	\$160	\$50	\$190	\$50
<b>FY 2017-18</b>	<b>\$250 - \$330+</b>	\$180	\$70	\$220	\$110+
<b>FY 2018-19</b>	<b>\$320 - \$420+</b>	\$220	\$100	\$260	\$160+

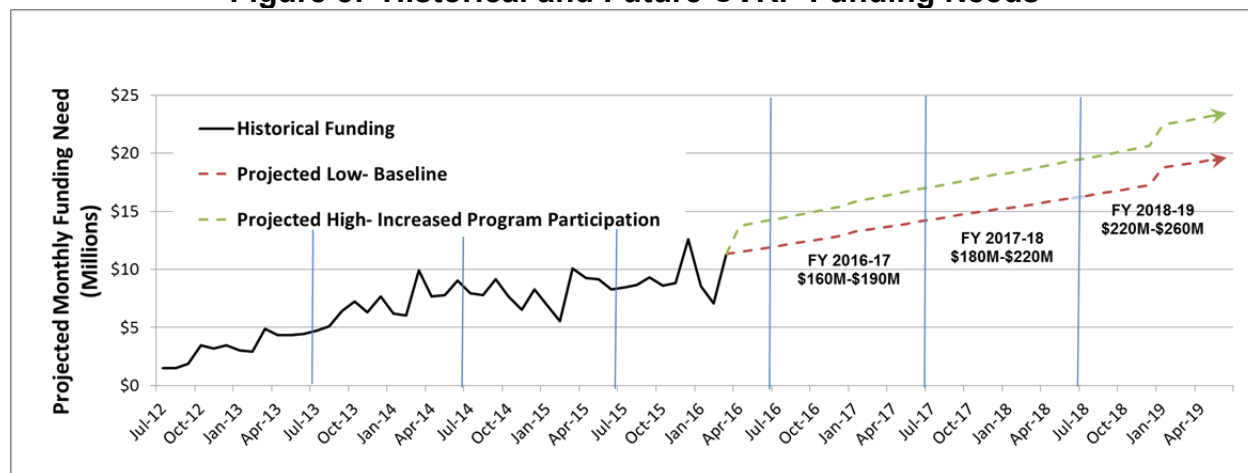
The CVRP funding estimates shown in Table 17 correspond to a projected rebate demand of: 68,000-82,000 rebates in FY 2016-17; 79,000-95,000 rebates in FY 2017-18; and 92,000-111,000 rebates in FY 2018-19.

### CVRP Three-Year Funding Estimates

CVRP funding estimates are based on linear extrapolations of vehicle registration and historical rebate data, as explained in the following section. Both ARB staff and CVRP stakeholders are aware that these funding projections are not meant to predict the future of the clean vehicle market, but rather to provide an estimation of funding needs. Furthermore, projections farther into the future contain greater uncertainties that are

difficult to model quantitatively. Uncertainties include new vehicle model introductions, fluctuation of gasoline prices, vehicle and battery prices, and other factors.

**Figure 8: Historical and Future CVRP Funding Needs**



### Projection Approach

ARB staff considered various approaches to projecting funding needs, and after comparing results, staff determined that linear extrapolations of historical data serve as a reliable method for short-term funding estimations at this time. Some stakeholders have expressed concern that linear extrapolations may not capture potential large increases in market growth. ARB staff considered using polynomial and exponential extrapolations, but these approaches produce unrealistic trends for the next three fiscal years. This may change as the market progresses, and ARB staff will reconsider the most appropriate forecasting approach each time it updates its projections. Other approaches, such as forecasting by each vehicle model factoring in future model introductions based on manufacturers' public announcements rely heavily on assumptions that have limited supporting empirical data. After these considerations, staff concluded that linear extrapolations of historical data are appropriate to estimate funding needs.

Staff acknowledges the comments from stakeholders at the April 4, 2016 public workshop and in subsequent comment letters that ARB's selected approach could potentially underestimate the funding needs if all manufacturers' announced future vehicle launches materialize in the most optimistic time frames.

ARB staff worked with CSE to develop the three-year funding projections by estimating market growth by technology type. Staff used linear extrapolations of data for each technology type to forecast short-term vehicle sales. Staff used vehicle registration data where available (March 2010 through 2015), and where not yet available, CVRP rebate data is used by adjusting it for historical rates of program participation to represent overall sales. About 82 percent of BEVs and about 63 percent of PHEVs purchased or leased in California receive a CVRP rebate; these participation percentages are estimates of BEV and PHEV overall sales in staff's projections. Due to the small

number of fuel cell electric vehicle data points, staff used a ZEV regulation compliance scenario (from 2011) instead of an extrapolation. The zero-emission motorcycle forecast was extrapolated from adjusted rebate data, assuming participation similar to the BEV category.

After staff estimated volumes for each technology type, funding need estimates were derived by multiplying forecasted volumes by the historical percentage of participating vehicles relative to the overall California market. Staff used current rebate amounts for each technology type (\$5,000 for fuel cell electric vehicles, \$2,500 for BEVs, \$1,500 for PHEVs, and \$900 for zero-emission motorcycles) as well as current CVRP administrative costs in these forecasts. There are not yet historical data available on which to directly project forward the impact on CVRP funding needs of the increased rebates for lower-income consumers and the income cap, so these impacts were evaluated in the sensitivity analysis described further below and found to fall within the ranges shown in Figure 8.

Staff estimated a low and a high range for long-term funding needs as shown in Figure 8. Both the high and low ranges are based on the historical growth since the beginning of CVRP. The low range estimate is the baseline, which assumes that growth, participation rates, and other technology trends remain unaffected. The high range assumes baseline growth and trends, but assumes CVRP participation will be at historical highs for each technology type. This means, staff assumed 63 percent of California PHEV buyers and 82 percent of California BEV buyers participate in CVRP to forecast the baseline case (or low range estimate of future funding needs), but staff assumed CVRP participation rates of 80 percent for PHEV buyers and 95 percent for BEV buyers in the high range estimate.

External factors that staff did not analyze due to a lack of quantitative data to directly model include the impact of:

- The upfront cost of ZEVs relative to conventional equivalents.
- Fuel costs and total cost of ownership.
- Other incentives such as federal incentives, high occupancy vehicle (HOV) lane access, subsidized electricity, free parking.
- Product diversity and new ZEV model introductions.
- ZEV awareness increased through education and outreach.

However, staff acknowledges that each of these factors may impact CVRP's future funding needs.

#### Sensitivity Analysis Scenarios: Effect of Assumption Changes

Staff conducted a sensitivity analysis to evaluate how various factors would impact the projections shown in Figure 8. For this sensitivity analysis, staff used the following baseline assumption:

- Data used from the life of the program (5 year extrapolation).
- Continued consistent growth for each technology type.
- Consistent project participation.
- Income criteria were not included.

Staff then modeled the 12 separate scenarios (in addition to the baseline scenario) shown in Table 18. This table shows the effect on the baseline of changing a single factor, while keeping in mind that these factors are heavily interrelated and complex.

**Table 18: Effect of Assumption Changes**

#	Scenario	% of Baseline-Low range	FY 16–17 (millions)	FY 17–18 (millions)	FY 18–19 (millions)
1	Baseline	100%	\$157	\$183	\$216
2	36-Month Extrapolation	93%	\$148	\$169	\$198
3	12-Month Extrapolation	90%	\$143	\$165	\$194
4	Historical low % of market rebated	76%	\$120	\$140	\$165
5	% of market rebated -10 points	86%	\$135	\$157	\$186
6	% of market rebated +10 points	114%	\$179	\$208	\$246
7	Historical high % of market rebated	120%	\$188	\$219	\$258
8	30% PHEV / 70% BEV	98%	\$155	\$181	\$210
9	60% PHEV / 40% BEV	85%	\$134	\$156	\$182
10	Income criteria	99%	\$156	\$181	\$214
11	Income criteria +25% additional participation by lower-income consumers	104%	\$162	\$189	\$224
12	Income criteria +50% additional participation by lower-income consumers	108%	\$169	\$197	\$233
13	Baseline w/extrapolated fuel cell electric vehicles	93%	\$146	\$172	\$197

Below is a short explanation of the assumptions that make up each of the scenarios listed in Table 18:

- Scenario 1 shows the Baseline or Low projection shown in Figure 8.
- Scenario 2-3 shows the effect in the change of the time span of data used to make the projections. Instead of projecting forward based on all data from the life of the project, these scenarios show the impact of extrapolating only using the last the last 36 months of data (Scenario 2) and only the last year of data (Scenario 3).
- Scenarios 4-6 show the effect of varying levels of participation, with Scenario 4 showing the effect of participation dropping to historical lows (even with baseline market growth).

- Scenarios 5 and 6 illustrate the effect if participation percentages were 10 percent above and below the project life average.
- Scenario 7 assumes participation is at its highest historical levels. This is the high end projection shown in Figure 8.
- Scenarios 8-9 show a change in technology type mixes, which currently average at about 60 percent BEVs and 40 percent PHEVs. Scenario 8 illustrates the effect if the percent of BEVs rebated were to reach 70 percent, and Scenario 9, if BEVs made up only 40 percent.
- Scenarios 10-12 show the potential effect of the recently implemented changes in income criteria (income cap and increased incentives for lower-income consumers). Scenario 10 shows, based on CVRP survey data, the effect of these changes without any corresponding increase in participation by lower-income consumers. Scenario 11 is based on an increase of 25 percent more lower-income consumers than the baseline, and Scenario 12, 50 percent more.
- Scenario 13 illustrates if the fuel cell electric vehicle category were to be linearly extrapolated in the same fashion as the more matured technology categories.

In Scenarios 10 through 12, staff modeled the impact that increased participation by lower-income consumers as a result of the increased rebates might have on the funding needs shown in Figure 8. Staff found that the increase in CVRP participation attributed to the higher rebates for lower-income consumers will likely fall within the range projected according to preliminary estimates based on the CVRP survey. Although this program change has the potential to increase funding needs, by both raising the rebate amount and increasing program participation among these consumers, the effect will be partially offset by the savings associated with implementing the income cap.

ARB staff continues to assess the clean vehicle market and continues to seek input on other assumptions or potential methods to enhance future projections. Staff believes that linear extrapolations with participation increased to historical highs are the most appropriate method to provide a funding need estimate over the next three year period. Staff acknowledge the high variability of this market and the possibility that funding needs may exceed (or fall below) the range provided. Staff also acknowledges that uncertainty increases the further out projection are made. Therefore, staff will continue to examine clean vehicle market trends, consult relevant peer-reviewed scientific studies, keep open communication with stakeholders, and update projections at least once a year.

#### Light-Duty Pilot Project Estimates

In addition to three-year funding projections for CVRP, staff also developed projections for light-duty pilot projects to benefit lower-income consumers and disadvantaged communities. The projections for light-duty pilot projects are based on current funding needs and were developed through a series of public work groups with external stakeholders. These projections, shown on Table 19, also account for future growth over the next three years.

**Table 19: Light-Duty Pilot Projects Draft 3-Year Funding Projections**

<b>Pilot Projects</b>	<b>Funding To Date</b> (millions)	<b>3-Year Projections</b> (millions)		
	FY 2014-15 & 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
EFMP Plus-up	\$12	\$30	\$30 to \$50	\$40 to \$70
Car Sharing	\$3.1	\$8	\$20 to \$25	\$25 to \$30
Increased Public Fleet Incentives for CVRP- Eligible Vehicles	\$3	\$3	*	*
Agricultural Worker Vanpools in San Joaquin Valley <i>(New for FY 16-17)</i>	-	\$3	\$3	\$3
Financing Assistance for Low-Income Consumers	\$0.9	\$6	\$20 to \$25	\$35 to \$50
Potential New Projects	-	-	\$0 to \$5	\$0 to \$10
<b>Total</b>	<b>\$19</b>	<b>\$50</b>	<b>\$70 - \$110+</b>	<b>\$100 - \$160+</b>

\* Project and funding transitioned to on-going set-aside within CVRP

+ Funding need may increase above range shown in table based on new project categories.

Projected funding needs for these pilot projects are based on a mix of staff experience in developing and administering these pilot projects and stakeholder input received since 2014. Stakeholders have consistently maintained that all of these projects serve an important equity function for lower-income and disadvantaged communities and urge ARB to provide increasing funding support as the pilot projects move forward. Below are more detailed discussions of how the three-year funding projections for the current pilot projects were developed.

In addition to these projections for current pilot projects, ARB staff is open to consideration of and encourages input regarding the potential for new pilot projects for clean light-duty transportation options. For FY 2016-17, staff will use the public work group processes for the existing pilot projects to consider new eligible components instead of proposing any new stand-alone pilot projects. For future funding cycles, staff will continue to seek input on possible new light-duty pilot projects. Projections of funding needs for FY 2017-18 and FY 2018-19 are subject to staff's continuing evaluation of performance of the existing pilot projects. Projections of data for all the projects will become more robust and informed as these projects are carried out. ARB will continue to seek stakeholder input regarding the effectiveness of the existing pilot projects and their opportunities for growth, as well as ideas for future funding needs to assist the State's lower-income and disadvantaged communities, meet GHG and other emission reductions needs, and help meet State goals for transforming the light-duty vehicle fleet to advanced clean technologies.

### *EFMP Plus-up*

- EFMP Plus-up's enhancement of retire-and-replace incentive projects is an essential component of ARB's strategy to transition California's light-duty vehicle fleet to zero-emission and near zero-emission technologies by assisting lower-income households in and near disadvantaged communities choose clean vehicles over older, high polluting alternatives in the marketplace.
- High demand has resulted in the existing EFMP Plus-up programs being over-subscribed with first year funding being exhausted after providing incentives for over 400 vehicles in less than six months of implementation. South Coast AQMD, which accepts applications in part through its website, has a backlog of roughly 2,000 applicants. The San Joaquin Valley APCD, which holds biweekly events, continues to see large volumes of interested and eligible applicants. Both air districts have worked to increase program efficiency and are now processing program participants at an even higher rate.
- The projected funding needs reflect both this upward trajectory of the existing programs as well as the expected expansion of EFMP Plus-up to additional air districts eager to implement their own EFMP Plus-up programs. Bay Area, Sacramento, and Santa Barbara air districts are expected to begin developing and potentially administering programs during the FY 2016-17 funding cycle and have demonstrated the ability to scale up incentive programs quickly. Additional districts may be added, and possible changes to the Carl Moyer Program Guidelines scheduled for spring 2017 may allow Carl Moyer Program funds to be used toward vehicle retire-and-replace programs and provide additional support of EFMP Plus-up programs.
- Currently, the supply of used plug-in hybrid- and battery-electric vehicles remains a hurdle in expanding the programs to levels higher than those being considered. As such, the funding need identified attempts to balance the improvements to the existing programs and expansion into additional areas of California with the projected availability of advanced technology vehicles in the used vehicle market.

### *Car Sharing*

- The FY 2014-15 \$2.5 million Car Sharing solicitation generated substantial interest, with 13 applications requesting more than \$16 million in funds. Staff experience with grantees as they build their projects suggests that these projects could be expanded and that other disadvantaged communities could benefit from similar projects.
- In addition to the proposed \$8 million in FY 2016-17, ARB staff projects that there is potential for between 40 to 50 new car sharing projects throughout California with a potential funding need of up to \$25 million in FY 2017-18, and up to \$30 million for FY 2018-19. This reflects staff's understanding of a potential

uptake for these types of projects, interest expressed by disadvantaged communities, stakeholder input of demand in the next three years, and staff's intent to encourage the willingness of car sharing companies to invest in disadvantaged communities.

#### *Public Fleets Increased Incentives*

- Transforming the public fleets that operate in and near disadvantaged communities to zero-emission and near zero-emission vehicles will deliver emission reductions and health benefits to the communities they serve. In addition to the health and other co-benefits these clean vehicles provide, residents will gain increased knowledge and experience with these vehicles and the technologies they employ as they operate in and around these communities. State incentives make up for federal tax credits that are not available to public fleets for the purchase of clean vehicles, and help facilitate fleet planning and budgeting to encourage introduction of these vehicles.
- ARB staff proposes \$3 million for Public Fleets Increased Incentives in FY 2016-17 based on demand since the project launched.
- Beginning with the process to develop the FY 2017-18 Funding Plan, staff recommends reevaluating the continuing need for Public Fleets Increased Incentives. If some level of continued incentives is appropriate, staff will recommend transitioning from a pilot project to a CVRP component available to public fleets.

#### *Agricultural Worker Vanpools in San Joaquin Valley*

- ARB staff proposes \$3 million for Agricultural Worker Vanpools in San Joaquin Valley for FY 2016-17 and has identified a similar funding need for the FY 2017-18, and FY 2018-19 funding cycles. While it is difficult to gauge exact future year funding needs for a project that hasn't yet launched, staff believes there is both a need and a demand for these types of projects in the San Joaquin Valley based on stakeholder input. Staff also believes that signaling ARB's interest in funding this project over multiple years is key to encouraging potential uptake. Staff is open to expanded funding for this type of project, but projecting future needs for a new pilot project is difficult, especially prior to engaging in a public process to develop project parameters and to determine the availability of appropriate technologies. Staff will closely monitor project implementation to inform and adjust funding needs for agricultural vanpools in future funding plans.

#### *Financing Assistance*

- ARB awarded \$0.9 million in FY 2014-15 funds for a financing assistance pilot project that provides low cost financing opportunities to lower-income consumers in the Bay Area.



- For FY 2016-17, ARB staff proposes an increased allocation of \$6 million for the Financing Assistance for Lower-Income Consumers pilot project. Staff recommends that \$5 million be available for a statewide project and \$1 million to support one or more local projects. If the State Treasurer's Office CPCFA is provided the statutory authority to offer financial assistance to consumers, ARB staff anticipates working with CPCFA to create a new statewide financing assistance pilot project. If this statutory authority is not provided, ARB staff would try to obtain a grantee through a competitive solicitation to administer a statewide financing project.
- Based on the strong demand from lower-income consumers for purchasing/leasing advanced technology vehicles through the EFMP Plus-up pilot project, staff estimates that the potential need for financing assistance could be substantial since not all lower-income consumers have access to low cost financing opportunities. In addition, the two air districts administering the EFMP Plus-up pilot project have noted to ARB staff that there are still a substantial number of lower-income consumers unable to participate because they have no or limited access to low cost financing. If these lower-income consumers are provided access to low cost financing opportunities, staff believes that the demand could increase substantially over the next few years.
- Staff acknowledges that developing a new statewide financing pilot project targeting lower-income consumers is a large task with many barriers to overcome. Stakeholders have maintained, and CVRP and EFMP Plus-up have demonstrated, that substantial financing assistance is needed for lower-income consumers throughout California. Although the estimated funding needs may seem ambitious and the pilot projects still need to be created and successfully administered, staff believes that there could be demand from lower-income consumers for funding of up to \$25 million in year two, and potentially up to \$50 million in year three.
- In addition, signaling long-term funding objectives should encourage interest from potential grantees to develop and administer new and innovative local and statewide financing pilot projects as well as increase financial institutions' interest in participating. If the pilot projects come to fruition, better information would become available in order to more accurately estimate funding needs for FY 2017-18 and beyond.

## **Market and Technology Assessment**

This section provides an overview of ARB staff's market and technology assessment, a second element of the long-term plan required by SB 1275.

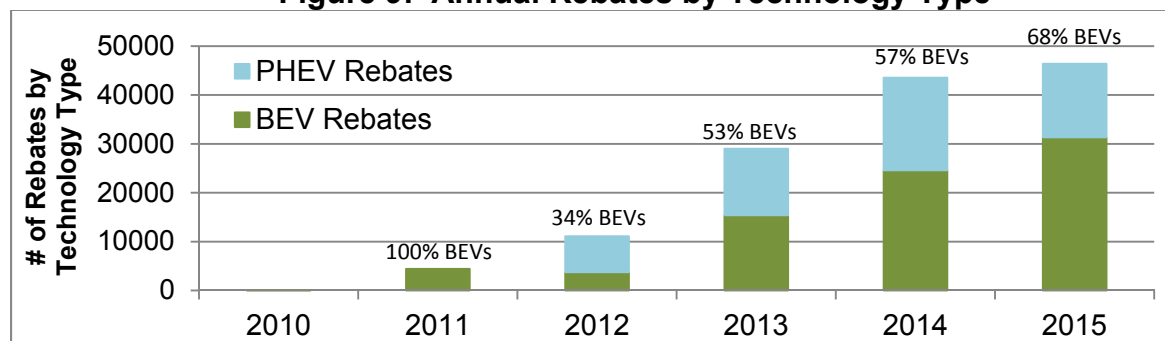
## Market Assessment

To conduct the market assessment, staff evaluated different aspects of the PEV market to understand where the market is today. Staff evaluated vehicle deployment, rebates by technology type, model releases, and rebate demand compared to gas prices.

In developing the three-year funding forecast for CVRP, staff evaluated vehicle data from various sources, including CVRP data and DMV registration data, in order to assess where the clean vehicle market is today. Although approximately 1.3 million PEVs have now been sold worldwide and 2015 showed strong growth with over 158,000 PEVs registered in California alone, PEVs still represent less than 1 percent of the nationwide light-duty vehicle sales last year.<sup>25,26</sup> In California, the PHEV and BEV sales account for 3.1 percent of total new car sales in 2015.<sup>27</sup> This number was 2.5 percent and 3.2 percent in 2013 and 2014 respectively. Fuel cell electric vehicles are just being introduced into the California market; there were only 229 fuel cell vehicles registered in October 2015.<sup>28</sup>

Over the life of CVRP, the technology split between BEVs and PHEVs has grown in favor of BEVs, in part due to technology advancements and model availability. In addition, the split between BEVs and PHEVs is heavily influenced by awareness and understanding of these advanced technologies in general, as well as many other factors. Figure 9 shows the number of rebates for BEVs and PHEVs and the percent of BEVs over the last 5 years.

**Figure 9: Annual Rebates by Technology Type**



*Fuel cell vehicles, zero-emission motorcycles, and neighborhood electric vehicles not shown.*

New model releases and product availability are important factors in the growth of CVRP. Since 2010, CVRP has provided rebates for 39 different vehicle models: 25 BEVs; 10 PHEVs; and 4 fuel cell electric vehicles. Today, 35 of these models remain available. Table 20 shows the progression of the new model eligibility over the last 5 years. Note that the table does not incorporate the release of new model years of a particular model.

<sup>25</sup><http://about.bnef.com/press-releases/electric-vehicles-to-be-35-of-global-new-car-sales-by-2040/>

<sup>26</sup>Vehicle Identification Number Analysis (VINA) Vehicle Registration (VR) Bi-Annual (OCT15) Extract.

<sup>27</sup><http://www.cncda.org/CMS/Pubs/Cal%20Covering%20Q%202015.pdf>

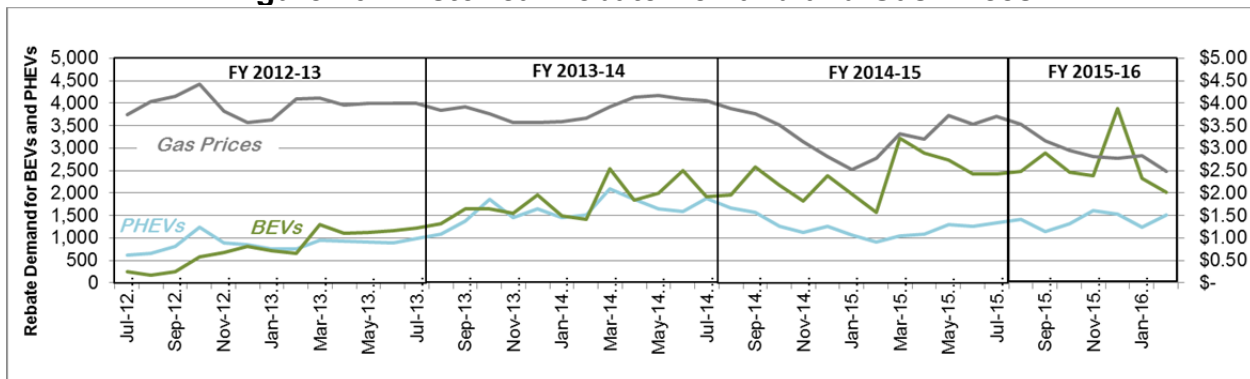
<sup>28</sup>Vehicle Identification Number Analysis (VINA) Vehicle Registration (VR) Bi-Annual (OCT15) Extract.

**Table 20: New Vehicle Models Released Since 2010**

Year	Model Eligible	Year	Model Eligible
2010	Tesla Roadster	2013	Ford Fusion Energi
	Honda FCX Clarity		Honda Accord Plug-in
	smart fortwo		Tesla Model S 60
	Nissan LEAF		FIAT 500e
2011	Th!nk City		Chevrolet Spark EV
	Wheego LiFe		Cadillac ELR
	Mitsubishi i-MiEV	2014	BMW i3
2012	Toyota Prius Plug-in Hybrid		Hyundai Tucson Fuel Cell
	Chevrolet Volt		BMW i3 REx
	Ford Focus Electric		Mercedes-Benz B250e
	CODA		Kia Soul EV
	Tesla Model S 85		Volkswagen e-Golf
	BMW 1 Series Active E	2015	Tesla Model S 70
	Mercedes-Benz F-CELL		Mercedes-Benz S-Class 550e
	Honda Fit EV		Toyota Mirai
	Toyota RAV4 EV		Tesla Model S 90
	Ford C-MAX Energi		Tesla Model X
	BYD e6		Hyundai Sonata Plug-in Hybrid
			Audi A3 e-tron
Legend (by color) : <span style="display: inline-block; width: 15px; height: 15px; background-color: #92d050; border: 1px solid black; margin-right: 5px;"></span> BEV <span style="display: inline-block; width: 15px; height: 15px; background-color: #a6c9ec; border: 1px solid black; margin-right: 5px;"></span> PHEV <span style="display: inline-block; width: 15px; height: 15px; background-color: #c0b0d0; border: 1px solid black;"></span> FCEV		2016	Volvo XC90 T8
			Bolloré Bluecar

ARB staff also evaluated historical rebate demand in relationship to monthly average California gasoline prices to determine if any relationship between the two exists. The results of that analysis are included in Figure 10.

**Figure 10: Historical Rebate Demand and Gas Prices**



This component of the assessment is important because ZEV sales in 2015 didn't grow as rapidly as prior years, and many stakeholders suspect this is because gas prices in 2015 were considerably lower than in previous years. Although gas prices were lower, ZEV sales have continued to grow as shown in Figure 10. There may be a relationship, but there isn't enough data to support the finding that a direct relationship exists. Further, in 2015, PHEV sales were lower because manufacturers limited offerings of

older models in preparation of the release of newer models at the end of 2015. PHEV sales are already showing growth again in the first quarter of 2016.

As discussed previously in the three-year forecast of the funding needs section, staff continues to assess the clean vehicle market and continues to seek input on available data sources, assumptions, and other potential methods for enhancing future projections and evaluations. Further, staff inquired at the public work group meetings on this topic if additional analysis for the market assessment was necessary and whether or not the assessment conducted as part of the three-year funding forecast met the stakeholders expectations for what SB 1275 requires. Stakeholders indicated that this approach is sufficient given the early state of the market.

Stakeholders did suggest a variety of other studies that could be evaluated for future market assessments and projections. These include: technology advancements and costs; oil prices; vehicle transaction prices; production costs of batteries and fuel cells; purchase vs lease rates; the used vehicle market; and the second life of batteries. Stakeholders also noted that it is important to ensure data collected from various studies use comparable assumptions and align with ARB's evaluation and to acknowledge the interdependencies of all the factors.

### *Conclusions from Market Assessment*

The market assessment shows positive signs of growth as demand for CVRP rebates has increased, number of eligible vehicles and participating manufacturers for rebates has grown, and overall ZEV sales rates are growing with CVRP-eligible vehicles now accounting for about 3 percent of annual passenger car sales. However, the ZEV market is still at its infancy and total ZEV deployment is far from the Governor's goal of 1.5 million ZEVs by 2025. As noted, staff will continue to examine clean vehicle market trends, review the latest published scientific studies, seek input from stakeholders, and update projections at least once a year.

### *Technology Assessment*

ARB staff has relied upon its own and outside light-duty vehicle technology assessments to help inform assumed vehicle costs, the overall status of technology, and long-term trends. Typically, these assessments cover a wide range of topics, including emission reduction strategies, electrification trends, safety considerations, and costs. Findings indicate positive trends such as significant battery cost reductions, and extended battery electric range.

Since adopting Advanced Clean Cars in 2012, ARB has been participating in a joint-agency review (commonly referred to as "the midterm review") of the nationwide GHG fleet average standards with the United States Environmental Protection Agency (U.S. EPA) and National Highway Traffic and Safety Administration (NHTSA). Now in its fourth and final year, a joint-agency draft technical assessment report (TAR) is being

finalized, and will include a full review of light duty vehicle technologies, including component and vehicle costs as well as projected GHG compliance costs.

Due to the nature of the review, it is important that the technical analysis being conducted in the midterm review be released in line with the full fleet analysis which is expected to be released in June 2016 (after the planned release of the proposed FY 2016-17 Funding Plan). The vehicle costs and technology assumptions that will be released in the draft TAR are a result of years of study, analysis, stakeholder feedback, and review. It is important that those numbers are considered in any future ARB technical assessment of advanced vehicles.

In addition to the joint-agency review, ARB is conducting its own midterm review on the ZEV regulation and particulate matter standards. ARB will hold a technical symposium in September 2016 on advanced conventional and ZEV technologies to gather more input on its review. ARB will release a final report in the fall 2016, which will build upon information released in the TAR, further exploring improvements made since the 2012 rulemaking and the 2016 summer TAR release. Staff plans to present its findings to the Board in December 2016.

Because these more comprehensive studies will not be concluded in time to incorporate into this year's SB 1275-required technical assessment, staff has limited the scope of the technology assessment to conducting an evaluation of the state of zero- and near zero-emission technologies by examining the following studies:

- Most recent ARB regulatory vehicle incremental cost projections published in December 2011 for the January 2012 Board hearing on the Advanced Clean Cars regulation proposal.
- The 2013 National Academies of Sciences (NAS) study that directly compares vehicle cost projections of varying electric vehicle types.<sup>29</sup>
- More recent battery system cost reference review.
- More recent fuel cell system cost reference review.

The following section summarizes each of these studies and presents the findings related to advanced technology vehicles cost projections through the year 2023. In developing the long-term plan, staff presented these findings at a public work group meeting with external stakeholders.

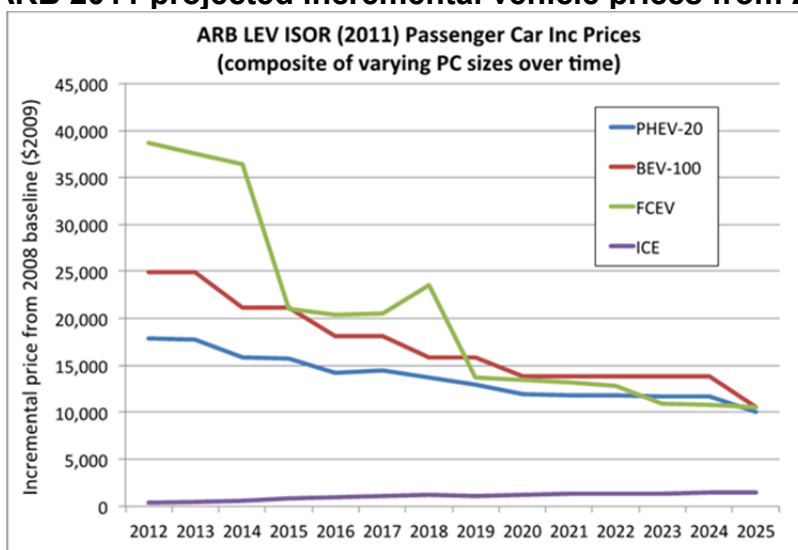
---

<sup>29</sup>National Academies "Transitions to Alternative Vehicles and Fuels 2013", Appendix F: The Vehicle Cost Summary ([http://cart.nap.edu/cart/deliverxls.cgi?p=tavf&f=appF\\_vehiclecostsumm](http://cart.nap.edu/cart/deliverxls.cgi?p=tavf&f=appF_vehiclecostsumm))

### ARB 2011 Advanced Clean Cars Staff Report (ISOR)<sup>30</sup>

In the Advanced Clean Cars staff report supporting data released in December 2011, ARB projected incremental vehicle prices from 2012 to 2025 are shown in Figure 11. This analysis was based on the joint agency technology assessment from 2010 and 2011 (ARB, U.S. EPA, and NHTSA). The values shown represent the increased price for the given technology above a 2008 baseline internal combustion engine (ICE) vehicle. The ICE curve near the horizontal axis of the plot shows that the incremental cost of producing an ICE vehicle increases slowly from zero (from a 2008 baseline vehicle in 2009 dollars) to a few thousand dollars in 2025. The slow increase represents the increased costs required to comply with increasing federal vehicle emission standards. Thus, it will cost from \$1,000 to \$2,000 more (in 2009 dollars) to produce an ICE vehicle in 2025 that is compliant with vehicle emission standards, than in 2008. The figure also indicates (for example) that in order to produce a fuel cell electric vehicle in 2016, it will cost almost \$20,000 more dollars (in 2009 dollars) than a similar 2008 ICE baseline vehicle. In 2023, all alternative drive trains will each cost between \$11,000 and \$14,000 more.

**Figure 11: ARB 2011 projected incremental vehicle prices from 2012 to 2025\***



\*BEV-100 refers to a battery electric vehicle (BEV) capable of 100 miles of range on a single charge, while a PHEV-20 refers to a plug-in hybrid electric vehicle (PHEV) capable of 20 all electric miles before the ICE engages to extend the range of the vehicle.

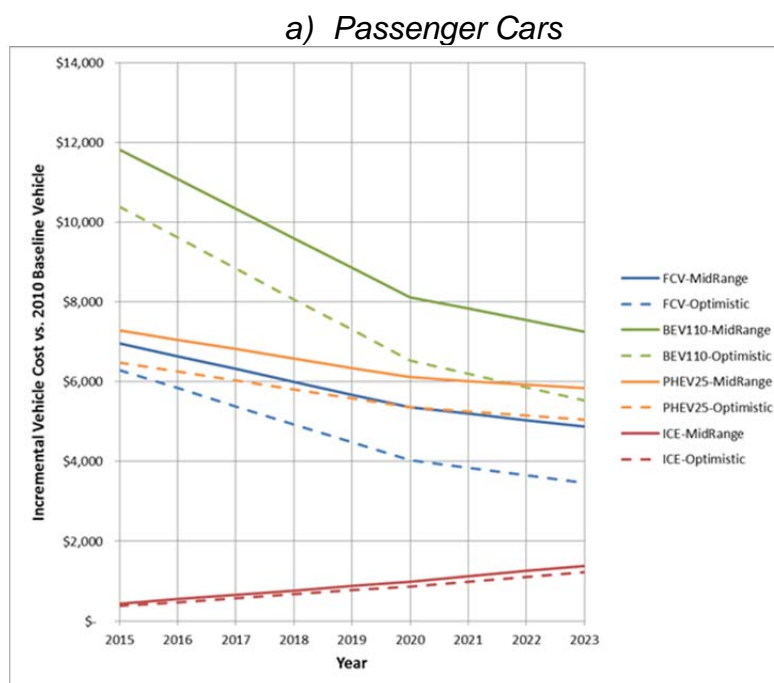
### NAS 2013 Model

The National Academy of Sciences Vehicle Cost Summary model (2013) is from the “Transitions to Alternative Vehicles and Fuels 2013” report. This is a well-known and publically available model that features both a “mid-range” and “optimistic” technology

<sup>30</sup>Advanced Clean Cars - AB1085 Background Materials for Emissions Data, Economic Data and Public Health Impacts. “ACC Compliance Scenario Summary” (Refer to tab 2 in the spreadsheet, rows 30-42). [http://www.arb.ca.gov/msprog/clean\\_cars/clean\\_cars\\_ab1085/clean\\_cars\\_ab1085.htm](http://www.arb.ca.gov/msprog/clean_cars/clean_cars_ab1085/clean_cars_ab1085.htm)

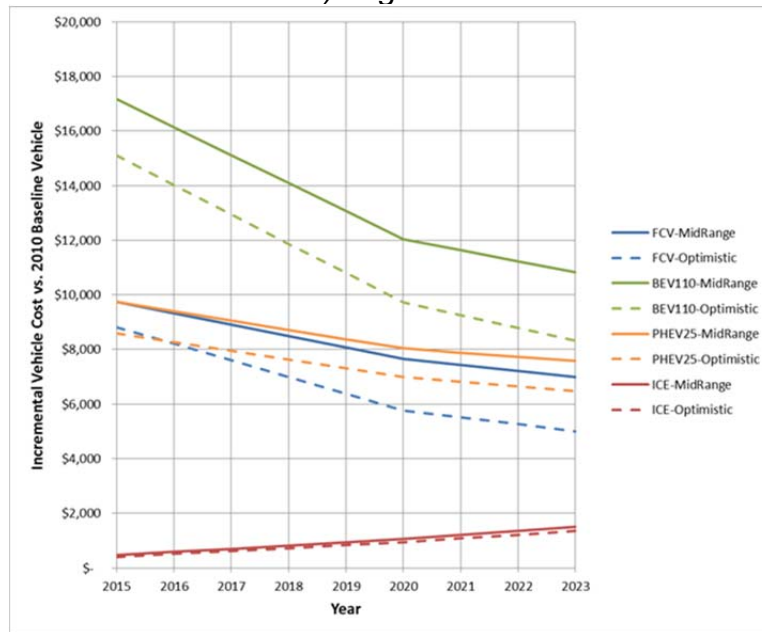
market.<sup>31</sup> The incremental advanced technology vehicle costs for the years 2015 to 2023 are shown in Figure 12. The first figure (12a) is for vehicles in the federal vehicle type classifications of “passenger cars” and the second (12b) for “light trucks.” These incremental costs are relative to a 2010 baseline ICE vehicle (in 2009 dollars). Interpretation of these figures is similar to the ARB figure above except that this time there is a 2010 baseline vehicle and BEV110 refers to a BEV with a 110 mile range, and PHEV25 refers to a PHEV with a 25 mile all electric range. For example, the passenger car projections indicate that in 2023, it will cost more than \$7,000 (in 2009 dollars) to produce a BEV110 over a similar baseline 2010 ICE vehicle in the “mid-range” market scenario. Although the ARB 2011 cost projections are compared to a 2008 baseline vehicle and the NAS 2013 model is with respect to a 2010 baseline vehicle, evidence indicates that the newer cost projection is lower than the original for the entire date range.

**Figure 12: NAS 2013 Vehicle Incremental Cost Projections: EVs vs. Conventional ICE Vehicle\*\***



<sup>31</sup> “Midrange” goals for cost and performance are ambitious but plausible in the committee’s opinion. Meeting this level will require successful research and development and no insurmountable barriers, such as reliance on critical materials that may not be available in sufficient quantities. The more optimistic goals are stretch goals: possible without fundamental technology breakthroughs, but requiring greater R&D and vehicle design success”. NRC 2013 Transitions to Alternative Vehicles and Fuels, National Academies Press, Washington DC.

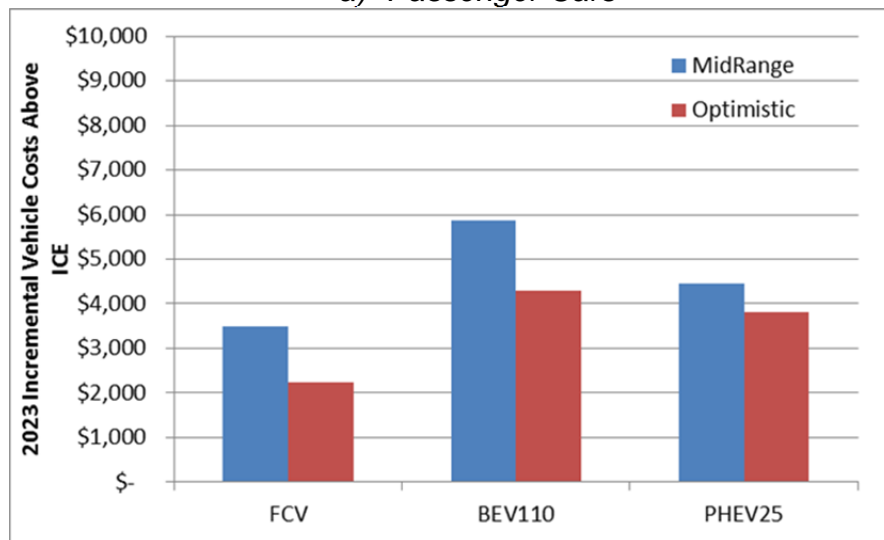
*b) Light Trucks*



Of particular interest to the SB 1275 requirements, is the 2023 difference in the incremental cost for a given advanced vehicle technology and its ICE vehicle counterpart. Thus, the 2023 differences are shown for both passenger cars and light trucks in Figures 13a and 13b. The passenger car figure (13a) indicates that under a mid-range market assumption, a 2023 BEV with 110 mile range, will cost almost \$6,000 more than a similar 2023 ICE vehicle.

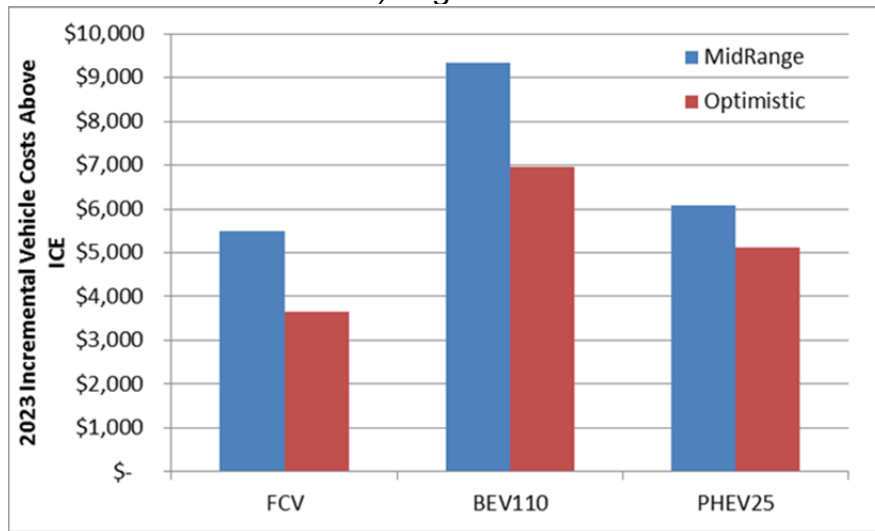
**Figure 13: NAS 2013 Incremental Vehicle Costs Above ICE in Model Year 2023\*\***

*a) Passenger Cars*





*b) Light Trucks*

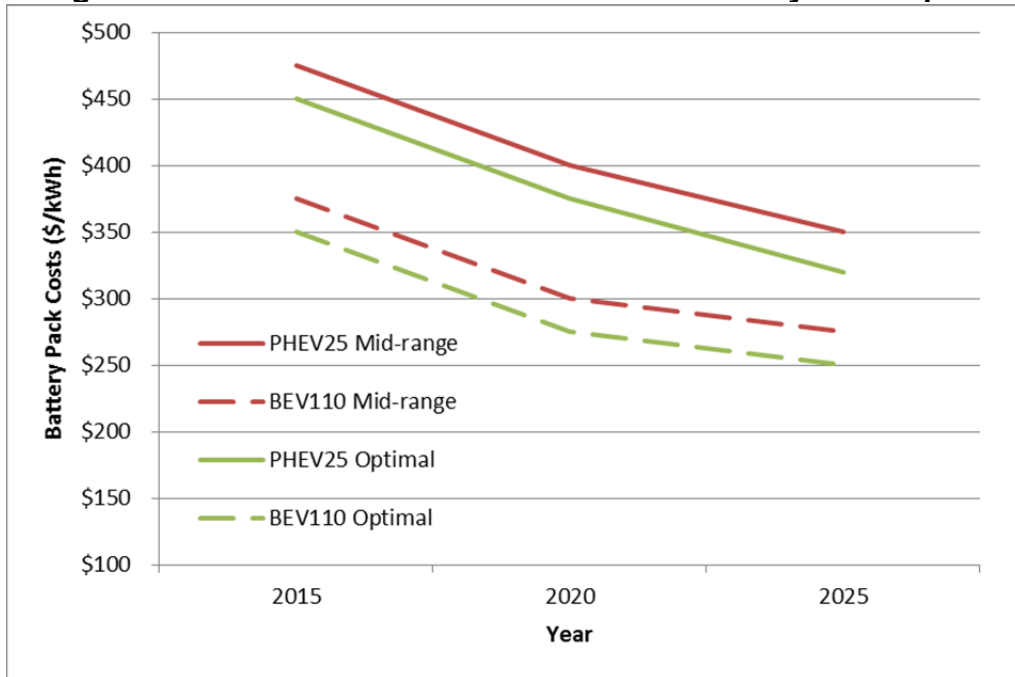


*\*\* Vehicle cost projections reference a 2010 ICE baseline vehicle. Fuel cell costs are based on an assumed annual production rate of at least 200,000 per year from 2015-2023. BEV and PHEV costs are based on an undefined high volume production for all time periods.*

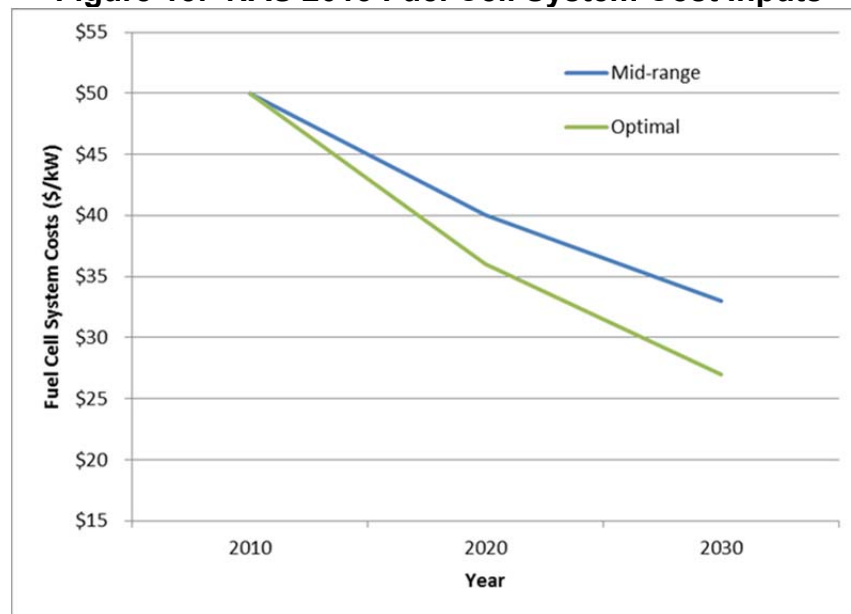
*System Cost Parameters from NAS 2013 Model*

The key cost input parameters for the NAS 2013 for battery pack fuel cell systems and hydrogen storage systems are shown in Figures 14 through 16. The costs are generally assumed to reduce over time as the technology improves and more vehicles produced per year allow for economies of scale. The values are shown for mid-range and optimal market assumptions for the years 2015 through 2025 (minimum to span 2023). The plots indicate a projected cost for PHEV battery packs in the mid-range market to be approximately \$350 per kWh of the battery pack in the year 2025, fuel cell system costs will be approximately \$33 per kW of the fuel cell stack, with a hydrogen storage system at a cost of approximately \$2,500, in the year 2030.

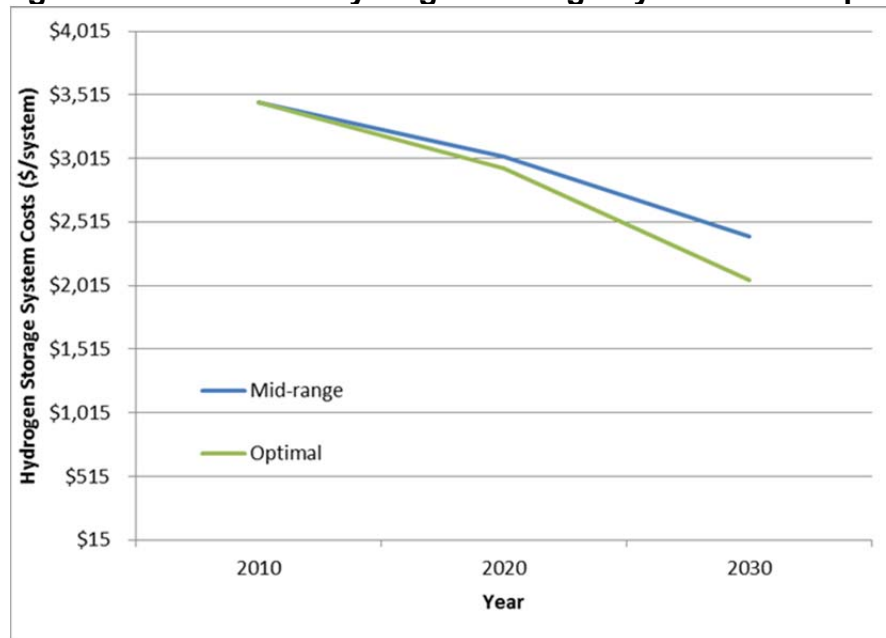
**Figure 14: NAS 2013 BEV110 and PHEV25 Battery Cost Inputs**



**Figure 15: NAS 2013 Fuel Cell System Cost Inputs**



**Figure 16: NAS 2013 Hydrogen Storage System Cost Inputs**



Staff has reviewed several more current sources covering battery system costs, fuel cell system costs, and hydrogen storage system costs.

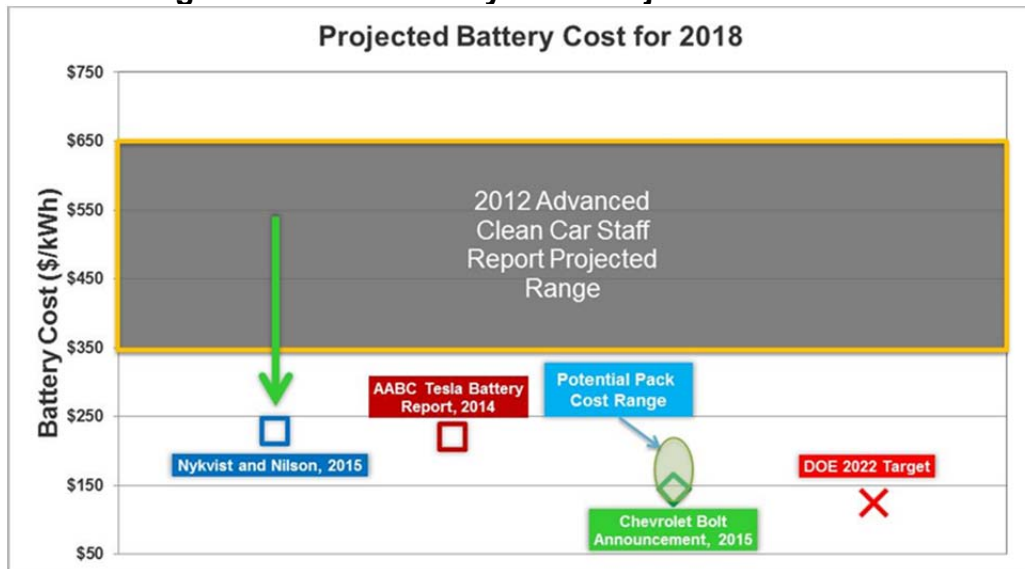
#### *BEV and PHEV Battery System Costs*

Review of the EPA NHTSA 2011 Joint Technical Support Document: Final Rulemaking for 2017 – 2025 Light-duty Vehicle GHG Emission Standards and CAFÉ Standards shows BEV battery costs that are lower than the NAS 2013 Model. However, PHEV battery costs are approximately the same as those used in the NAS 2013 Model.

The BEV battery cost projections for 2018 from newer cost analyses and announcements (as presented to the ARB Board in October 2015) are shown in Figure 17.<sup>32</sup> The grey band along the top of the figure represents the range of battery costs in dollars per kWh of the battery pack assumed for 2018 from the ARB 2012 Advanced Clean Car Staff Report. The four points below the grey band each represent individual data points from individual sources that represent newer or updated information. The plot indicates that projections in 2012 regarding 2018 are already too high for 2014 and 2015. The last of the four points is a target set by the DOE for 2022.

<sup>32</sup>The grey band across the top represents the range of battery costs assumed for 2018 from the ARB 2012 Advanced Clean Car Staff Report. The four points below that are from: Nykvist and Nilson, Rapidly falling costs of battery packs for electric vehicles, March 23, 2015, <http://www.nature.com/nclimate/journal/v5/n4/full/nclimate2564.html>; Anderman, The Tesla Battery Report, November 12, 2014, <https://www.advancedautobat.com/industry-reports/2014-Tesla-report/Extract-from-the-Tesla-battery-report.pdf>; Chevrolet Bolt Announcement, October 2, 2015, <http://www.hybridcars.com/gm-ev-battery-cells-down-to-145kwh-and-still-falling/>; and the U.S. DOE 2022 Target, January 31, 2013, [http://energy.gov/sites/prod/files/2014/02/f8/everywhere\\_blueprint.pdf](http://energy.gov/sites/prod/files/2014/02/f8/everywhere_blueprint.pdf) respectively.

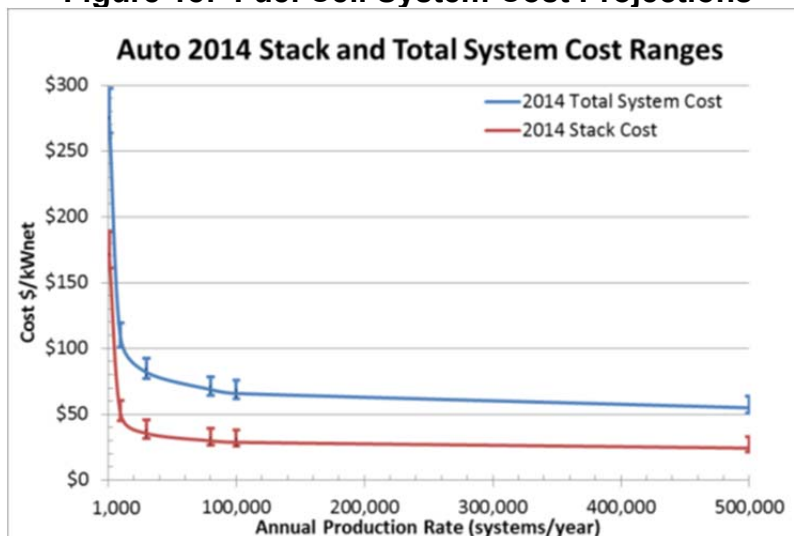
**Figure 17: BEV Battery Cost Projections for 2018**



### *Fuel Cell System and Hydrogen Storage System Costs*

The fuel cell system cost projections in dollars per kW of the fuel cell system as a function of annual production rates are shown in Figure 18.<sup>33</sup> The plot indicates that when only 1,000 units are produced per year, the cost of the total system is approximately \$300 per kW of the fuel cell system. But, when 500,000 units are produced per year, the cost is approximately \$50/kW.

**Figure 18: Fuel Cell System Cost Projections**

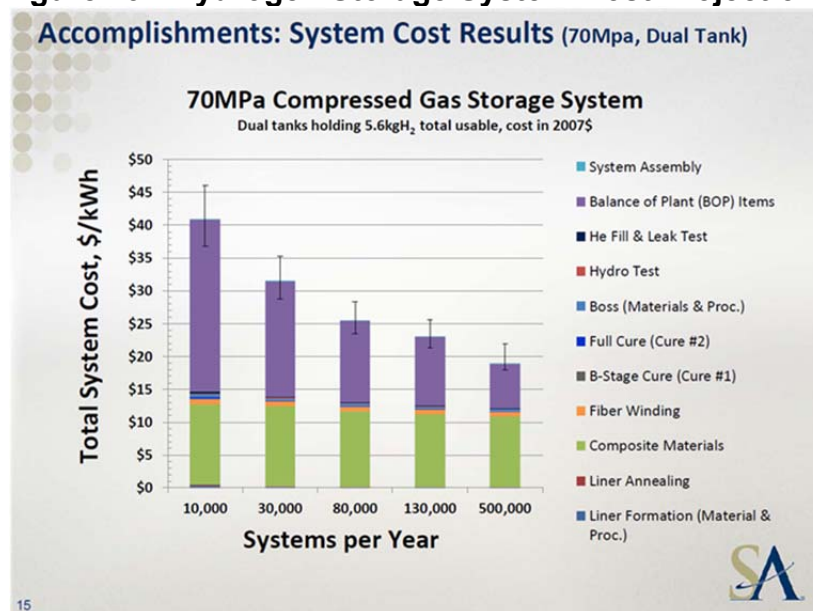


<sup>33</sup>James, Brian. "Fuel cell vehicle and bus cost analysis." Annual Merit Review and Peer Evaluation Meeting. U.S. Department of Energy. Arlington, VA. 10 June 2015. Presentation.

## Hydrogen Storage System Costs

The hydrogen storage system cost projections as a function of annual production rates for a two tank (187kWh) system holding 5.6 kg of hydrogen are shown in Figure 19.<sup>34</sup> The plot indicates that for 70MPa (about 10,000 psi of pressure), when 10,000 units are produced per year, a two-tank hydrogen storage system will cost approximately \$40 per kWh of storage. The colored legend on the right indicates what specific component of the storage system is assigned which color on the plot. It appears that most of the costs are due to the materials needed for the construction of the tanks, and for the balance of plant (BOP), which includes valves, safety releases, regulators, etc.

**Figure 19: Hydrogen Storage System Cost Projections**



## Conclusions from Technology Assessment

ARB staff recognizes that this assessment does not directly inform the appropriate funding level, incentive type, or incentive amount. However, this assessment helps to show how vehicle technology costs are declining, in most cases, quicker than originally expected. These are all positive signs for the development of the ZEV market. This assessment, combined with the market assessment, three-year funding forecast, and market sustainability assessment, aim to provide a framework for incentives policies going forward. The efforts underway with the TAR and midterm review will further illustrate and verify the course of technology advancement, serving as important tools in future updates and evaluations.

<sup>34</sup>ibid

## A Sustainable ZEV Market

To address the requirements of SB 1275 related to the self-sustaining market assessment, ARB staff took the following approach:

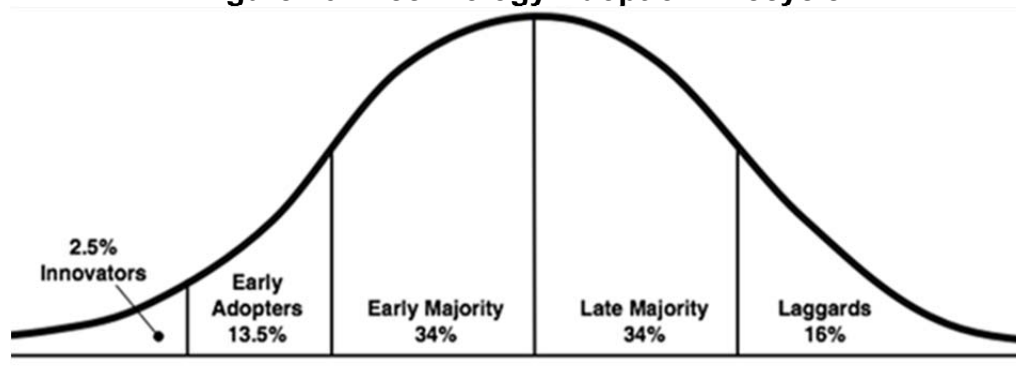
1. Considered definitions of “self-sustaining ZEV market” and identified various indicators to determine how and when a self-sustaining market may be achieved.
2. Evaluated possible modifications to the current incentive structure and how to ramp it down over time.
3. Evaluated other incentive structures to determine the most effective incentive approaches for promoting the ZEV market.

### *Defining a Self-Sustaining ZEV Market*

Studying the evolution of the current ZEV market, including the interaction of policy, technology, energy systems, and consumer culture, is essential to understanding the overarching dynamics of the ZEV market. Staff reviewed a broad range of literature to help define a self-sustaining ZEV market. The Diffusion of Innovation Theory, developed by Everett Rogers, is one of the oldest social theories related to ideas and technology adoption.<sup>35</sup> Staff believes this behavioral change model serves as an appropriate framework to lay the foundation for this discussion.

The theory essentially seeks to explain how, why, and at what rate new ideas and technology spread. In other words, consumers adopt new technologies at varying rates. Their relative speed of adoption follows a bell curve, with the primary difference being individuals' psychological disposition to new ideas. Based on this definition, consumers are categorized into five different classifications on the basis of adopting innovations. As shown in Figure 20, the five categories include innovators, early adopters, early majority, late majority, and laggards. These five broad categories of adopters each have a specific set of characteristics in relation to embracing innovative products.

**Figure 20: Technology Adoption Lifecycle**

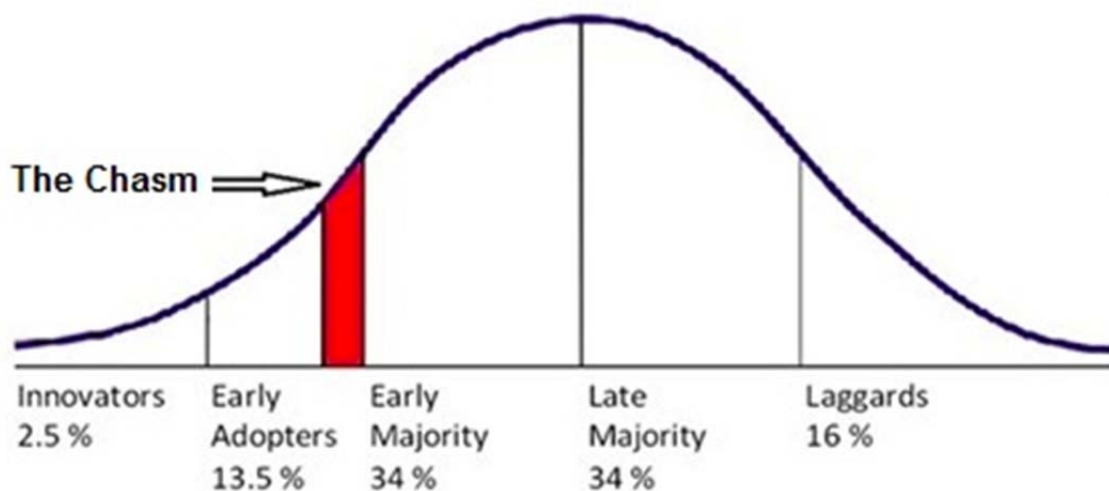


<sup>35</sup>Rogers, E.M., (2003) “Diffusion of Innovations”.5th ed.

Innovators are the first 2.5 percent of a group to adopt a new idea. The next 13.5 are early adopters followed by 34 percent early majority, 34 percent late majority, and laggards as the last 16 percent of the group of consumers in a market.

In 1991, Geoffrey A. Moore expanded the theory with the focus on high tech products and argued that there is a chasm between the early adopters of a high tech product (the technology enthusiasts) and the early majority (as shown in Figure 21).<sup>36</sup> He found that during the diffusion process, the focus should be on one group at a time, using each group as a base of transition to the next. He argues that the most difficult step is making the transition from early adopters to early majority, mostly because of their very different expectations, which creates a chasm between the two groups. Crossing this chasm is necessary to ensure successful diffusion of the technology into the next adopter categories.

**Figure 21: Transitioning Early Adopters to Early Majority<sup>37</sup>**



Staff believes these theories help to provide a foundation for understanding technology adoption and may serve as a guide when using certain indicators to evaluate the market. These theories are well established among academia and empirically validated across many product categories. They can help in understanding consumer purchase decisions and market development processes for PEVs. For example, if the adopter categories outlined here were compared against current new car sales, California's market, at 3.1 percent of new car sales, is just starting to enter the early adopter phase.

<sup>36</sup>Moore, G.A., (1991) "Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers"

<sup>37</sup>Adapted from Moore, G.A., (1991) "Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers"

Staff presented the concept of using this theory to help define a self-sustaining ZEV market at a public work group in February 2016. The majority of the stakeholders argued that it is too early to provide an accurate definition or forecast on market sustainability as the ZEV market is still in its infancy and there is a lack of relevant data. Staff presented a list of indicators that could be evaluated to show where ZEV market and technology is on the path to broad consumer adoption and received mixed feedback about how these indicators may be helpful. Below is the list of indicators and feedback associated with each approach:

- Evaluation of annual new ZEV sales in the comparable California new car market.
  - Stakeholders noted that because a regulatory requirement for ZEVs exists, using annual sales or some other “market percentage” approach to evaluating market sustainability would be distorted. However, this approach presents the most available and reliable data compared to other indicators.
- Consideration of technology advancement (such as improved battery range).
  - This approach provides useful insight regarding the advancement and improvements in technology over time but doesn’t necessarily provide a signal or guide related to sustainability. Additionally, since range options among BEVs are limited, there are not any significant data sources available to analyze from this approach.
- Evaluation of battery/fuel cost or vehicle price.
  - Vehicle manufacturers argue that the market for ZEVs is sustainable only when the vehicle can be sold for the amount of money it takes to produce and market that vehicle. ARB staff agrees that this is a clear approach for evaluating sustainability on a per-vehicle basis, but notes that there are no current (2014 or more recent) available or reliable data on full vehicle manufacturing costs and transaction prices to analyze. As noted in the Technology Assessment section, technology costs (associated with batteries, fuels, fuel systems, etc.) are being evaluated closely in the 2016 TAR and mid-term review. The results of those analyses may help provide some insight on how this type of indicator can be evaluated better over time.
- Consideration of vehicle choice diversity and/or number of manufacturers that produce ZEVs.
  - Similar to technology advancement above, this approach is useful for showing how the technology is spreading over time but is more difficult for use in measuring market penetration. From a consumer behavior standpoint, the more vehicle choice diversity exists, the more options consumers have for making a ZEV purchase decision, and the more likely consumers will adopt



the technology broadly. An ARB-sponsored research project, to be finalized in mid-2016, is examining the impact of the number of PEV models on the market.

- Analyzing the used ZEV market.
  - The used (or secondary) ZEV car market is an important element of the overall market, as some consumers may opt to test the newer technologies through used vehicle purchases instead of buying new. Staff agrees that understanding the used ZEV market is important, but as this market is especially new, available and reliable data is limited. Staff is continuing to seek reliable sources of data to better understand the secondary market. An ARB-sponsored research project focused on the secondary PEV market, expected to be finalized by mid-2017, will shed light in this area.
- Evaluating consumer awareness about ZEVs.
  - Education and awareness is a critical component to the broad adoption of ZEVs. Consumers are generally unaware of ZEV technologies, including their availability, benefits, and available incentives, but as their knowledge increases so does their interest. A 2011 survey of adults with current driver's licenses in the 21 largest American cities asserts that two thirds of respondents provided incorrect answers to basic factual questions about PEVs.<sup>38</sup> They also found 94 percent of the respondents were unaware of these local and state PEV incentives, although 82 percent of them claimed purchase incentives would make them more likely to consider buying a PEV.

ARB-sponsored research determined that financial incentives alone do not overcome the barriers of the people who do not already have a favorable valuation of ZEVs. Simply making the vehicles less expensive doesn't address the lack of knowledge and litanies of concerns and barriers, perceptual and real, to ZEV acquisition and use.<sup>39</sup> Furthermore, studies show that when consumers are more familiar with PEVs, they express stronger interest in acquiring a PEV, while those that are unaware or have misconceptions about them are less likely to be interested in acquiring PEVs.<sup>40,41</sup>

- Infrastructure development.
  - Based on existing literature, the availability of charging infrastructure is an important predictor of PEV adoption. The Energy Commission has made

---

<sup>38</sup>Krause, R. M., et al. (2013). "Perception and reality: Public knowledge of plug-in electric vehicles in 21 U.S. cities." *Energy Policy* 63(0): 433-440.

<sup>39</sup>Kurani, K. S., et al. (2015). *New Car Buyers' Valuation Toward Zero-Emission Vehicles: California*.

<sup>40</sup>Krause, R. M., et al. (2013). *ibid*

<sup>41</sup>Kurani, K. S., et al. (2015). *ibid*

significant investments to support PEV infrastructure as noted earlier in the Funding Plan. Infrastructure development, or lack thereof, is one of the primary barriers to PEV market penetration<sup>42</sup> and some research suggests that construction of one charging station for every 100,000 residents could have twice the impact on a country's PEV adoption than financial incentives of \$1,000 to consumers.<sup>43</sup> Moreover, coordinating the Energy Commission's investments in charging infrastructure and ARB's investments in light-duty vehicle deployment may increase the PEV market share and ultimately support a sustainable PEV market.

Additionally, stakeholders suggested the following indicators for ARB staff consideration:

- Cost of avoided health impacts for each ZEV brought into the market.
  - Stakeholders asked ARB staff to look more broadly at avoided health impacts and the costs associated with them and correlate those costs with the costs of ZEV adoption. Essentially, some stakeholders argued that ZEV market sustainability depends upon the elimination of related pollution and the existence of zero healthcare costs associated with that pollution. American Lung Association in its second report on Public Health and Societal Benefits of a Zero Emission Vehicle Fleet in California provides useful findings on annual and daily avoided health damages and costs as a result of a 100 percent ZEV fleet in California.<sup>44</sup> ARB staff agrees that this analysis is important and fits best within the larger planning efforts that take place, including the development of the SIP, AB 32 Scoping Plan, and other guiding efforts.
- Understanding consumer's willingness to pay for ZEV technology.
  - In addition to increased consumer awareness, improvements in consumer willingness to pay for ZEV can be used as another measure toward sustainable ZEV market.

Considering the dynamic nature of the early ZEV market with various driving forces and multiple perspectives, staff believes that multiple indicators may be helpful for both defining a self-sustaining ZEV market and tracking progress toward achieving sustainability. Other indicators or topics staff is continuing to explore include infrastructure and the value of other non-monetary incentives. Given the availability of

---

<sup>42</sup>National Research Council of the National Academies (2015), "Overcoming Barriers to Deployment of Plug-In Electric Vehicles"

<sup>43</sup>Sierchula, W., et al. (2014). "The influence of financial incentives and other socio-economic factors on electric vehicle adoption." *Energy Policy* 68(0): 183-194.

<sup>44</sup>American Lung Association. (2012) THE ROAD TO CLEAN AIR II – A Zero Emission Future, Public Health and Societal Benefits of a Zero Emission Vehicle Fleet in California.  
<http://www.lung.org/assets/documents/research/estimated-prevalence.pdf>

data, staff recommends using the available research on technology adoption to help guide the discussion for this first year.

Staff recommends using Moore's theory, built upon Rogers' Diffusion of Innovation Theory, as a starting point for defining a self-sustaining ZEV market. As noted above, once a technology transitions from early adopters to early majority of consumers, the technology is most likely to be successful in diffusing across the remaining adopter categories. Staff recommends applying this theory to the new car market - specifically, sales of light-duty passenger vehicles by comparing annual new ZEV sales to California comparable light-duty new car sales.

The theory suggests that 16 percent of a population represents when the market has penetrated the most difficult group of adopters for ensuring success of a technology. Staff believes that if this is applied to the comparison between ZEVs and comparable new car sales in California that it would represent about 200,000 vehicles in a given year, in today's vehicle market. This assumes a California vehicle market of about 2 million new vehicle sales per year, with 60 percent of those vehicles being light-duty automobiles. Given that sales of ZEVs and PHEVs combined only reached around 60,000 in 2015, staff believes it will take at least another 5 to 10 years before this level of adoption is achieved.

This provides a starting point for assessing when the ZEV market will be sustainable. Staff will re-assess this evaluation and adjust accordingly in future long-term plans as the market grows over time and new data become available.

### *Ramping Down Incentives Over Time*

As noted above, staff believes that broad purchase incentives remain important for at least the next 5 to 10 years, until the ZEV market makes up 16 percent of California new light-duty passenger vehicle sales. The last few percent of those adopters are the most critical, making incentives critical in overcoming that chasm of technology adoption. Focused financial incentives, or other types of incentives may still be necessary beyond that point.

Hence, staff recommends continuing the current incentive structure for the next several years, with modifications for effectiveness as necessary. However, the funding needed to support such a commitment may exceed funding available. Staff is considering the following approaches for ramping down the current incentive program, CVRP, under both of the following situations: once the market approaches the sustainability threshold and to address possible budgetary constraints.

- Adjust income eligibility requirements.
  - Staff recommends adjusting income eligibility requirements over time such that the project transitions to focusing investments on economically challenged populations, consistent with the Conceptual Evolution of the Role

of Incentives, as presented in the FY 2015-16 Funding Plan.<sup>45</sup> Staff will monitor income distribution within the project and consider adjustments over time as appropriate to ensure continued effectiveness of the project. However, this modification may also be used as a lever to make short-term changes to the project in response to budgetary constraints. Staff believes this type of adjustment is consistent with the intent of SB 1275.

- Lower the incentive amount over time.
  - Staff recommends to ramp down incentive levels slowly as more is learned about technology costs. Changes in incentive amounts should be linked to the reduction of technology cost premiums. However, because of the difficulty in obtaining the most appropriate data for this type of analysis, this approach would also be appropriate to implement as the ZEV market reaches the sustainability threshold. For example, the incentive could be reduced by \$500 once 5 percent, 10 percent, and 15 percent of market share is achieved, thus slowly ramping down the incentive for PHEVs and ZEVs such that the cleanest vehicles continue to receive an incentive of about \$1000 as the market approaches the early adopter market.
  - Reducing rebates may be necessary in the future to address budgetary constraints. Staff cautions however, that significant reductions too quickly could have a negative effect on the market. Several studies indicate that the timing of incentives relative to market maturity is important in nurturing an emerging market for advanced technology clean vehicles.<sup>46</sup> A modeling study of adoption of PEVs in San Francisco suggests that it is too early to remove the state rebate because adoption rates would be cut significantly.<sup>47</sup> In another study, Greene concluded that the timing of incentives is important in determining the overall benefits of clean vehicle incentive policies.<sup>48</sup> Georgia ended its \$5,000 income tax credit for PEVs on July 1, 2015, and market data show sales have plummeted suggesting the removal of the incentive occurred before the market was mature enough to be self-sustaining.<sup>49</sup>
- Implement a manufacturer's suggested retail price (MSRP) cap.
  - Similar to adjusting the project based on income eligibility, this approach is aimed at targeting ZEV sales toward more mainstream vehicle purchases. Staff recommends that this approach only be considered in future years to

---

<sup>45</sup>Proposed Fiscal Year 2015-16 Funding Plan for Low Carbon Transportation Investments and the Air Quality Improvement Program (2015). Air Resources Board.

<sup>46</sup>Eppstein, M. J., et al. (2011). "An agent-based model to study market penetration of plug-in hybrid electric vehicles." *Energy Policy* 39(6): 3789-3802.

<sup>47</sup>Adepetu, A., et al. (2016). "An agent-based electric vehicle ecosystem model: San Francisco case study." *Transport Policy* 46: 109-122.

<sup>48</sup>Green, E. H., et al. (2014). "Increasing electric vehicle policy efficiency and effectiveness by reducing mainstream market bias." *Energy Policy* 65: 562-566

<sup>49</sup>Adepetu, A., et al. (2016). *ibid*

address budgetary constraints, as the above approaches listed are more appropriate for addressing technology costs and market advancement.

- Phase out rebates for lower electric range.
  - This approach is aimed at maintaining incentives for only the cleanest vehicles in the long-term. Because fuel cell electric vehicle, BEV, and PHEV technologies are all critical to meeting long-term air quality and climate change goals, staff would only consider this approach in future years if necessary to meet budgetary constraints.

### *Alternative Incentive Structures*

Staff conducted a literature review to better understand the suite of incentive options and their effectiveness in promoting the adoption of clean vehicles and meeting environmental goals. Preliminary research findings indicate that making PEVs more affordable through purchase incentives has the greatest impact on PEV adoption compared to other strategies studied.<sup>50</sup>

Research suggests that the most effective incentives are purchase subsidies, HOV access and emission testing exemptions, and that their effect is stronger on BEV market share compared with the PHEV market.<sup>51</sup> However, other state-specific factors, such as market maturity, charging infrastructure and consumer knowledge, appear to also play a significant role in the success of the PEV market in those states.<sup>52</sup>

Fully understanding the effects of each individual incentive is a challenge because several states offer different combinations of incentives that likely have a compounding effect. For example, California offers both HOV access and the \$2,500 CVRP rebate to BEV purchasers and has a much larger BEV market share than Colorado which offers only an income tax credit for BEV purchasers capped at \$6,000.<sup>53</sup> In contrast, Washington State has roughly the same BEV market share as California despite a BEV state subsidy in the form of a sales tax exemption which is about \$500 smaller than California's CVRP rebates and no special HOV access.<sup>54</sup>

Although staff recommends maintaining the current incentive structure for the next several years, it also evaluated several alternative incentive options as possible alternatives to CVRP in the future to provide the Board and stakeholders information to consider in evaluating ARB's light-duty vehicle incentive strategy moving forward.

---

<sup>50</sup>Adepetu, A., et al. (2016). *ibid.*

<sup>51</sup>Jin, L., et al. (2014). "Evaluation of state-level U.S. electric vehicle incentives, The International Council on Clean Transportation" White Paper.

<sup>52</sup>Adepetu, A., et al. (2016). *ibid.*

<sup>53</sup>Jin, L., et al. (2014). *ibid.*

<sup>54</sup>Jin, L., et al. (2014). *Ibid.*

- Purchase Rebates and Tax Incentives
  - Research suggests that policies offering upfront payments, such as point-of-sale sales tax waivers, appear to be more effective than deferred payments, such as rebates and tax credits.<sup>55,56,57</sup> Some studies suggest that purchase tax credits are the least effective policy at reducing GHG emissions from the transportation sector because they require excessive government expenditures to make a significant difference.<sup>58</sup> Furthermore, Green, Skerlos et al. (2014) assert that incentives in the form of income tax credits are not cost-effective because they mostly subsidize vehicle purchases that would have happened anyways since most consumers do not have a tax liability high enough to use the tax credit.<sup>59</sup>
  - To date, the majority of research in this area has focused on hybrid electric vehicles (HEV). Several studies analyzed PEV incentives both in the U.S. and in other countries and found that each incentive offered has had a different effect within each different market. Because the ZEV market in general is still in its infancy, each individual market reacts to incentives differently, thus making it difficult to draw clear conclusions about the best form of incentive for California.
  - Some research indicates that tax credits are considered more desirable because they directly offset a taxpayer's liability in the exact amount of the credit, whereas tax deductions reduce the amount of reported income that is subject to taxation rather than directly offsetting taxes owed. However, tax credits are available only to those who file a tax return, and tax deductions are available only to those who file an itemized tax return. Studies show that less than 50 percent of federal tax returns claim itemized deductions.<sup>60</sup>
- Sales Tax Exemption
  - Sales tax exemption benefits are realized immediately at the point-of-sale. This type of incentive would not lend itself to constraints on participation such as income limitations or ownership requirements. In addition, the incentive would essentially be available to anyone, including those who would have

---

<sup>55</sup>Diamond, D. (2009). "The impact of government incentives for hybrid-electric vehicles: Evidence from US states." *Energy Policy* 37(3): 972-983.

<sup>56</sup>Beresteanu, A. and S. Li (2011). "Gasoline prices, government support, and the demand for hybrid vehicles in the United States." *International Economic Review* 52(1): 161-182.

<sup>57</sup>Gallagher, K. S. and E. Muehlegger (2011). "Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology." *Journal of Environmental Economics and Management* 61(1): 1-15.

<sup>58</sup>Morrow, R. W., et al. (2010). "Analysis of policies to reduce oil consumption and greenhouse-gas emissions from the US transportation sector." *Energy Policy* 38(3): 1305-1320.

<sup>59</sup>Green, E. H., et al. (2014). *ibid.*

<sup>60</sup>Prante, G. 2007. "Most Americans Don't Itemize on Their Tax Returns." Tax Foundation, July. <http://taxfoundation.org/article/most-americans-dont-itemize-their-tax-returns> .

purchased advanced clean vehicles anyway. This approach has impacts on local sales tax and cannot be applied toward leased vehicles in the same way it is applied to purchased vehicles. This approach would require legislative action.

- Feebates
  - There is much research evaluating feebates as an incentive approach. Feebates refer to collecting an upfront fee applied to the purchase or registration of vehicles that a government is trying to disincentivize (such as those with lowest gas mileage or the highest emitters) and using the revenues generated by that fee to incentivize the purchase of cleaner vehicles. Several European countries have instituted various feebate programs. Brand, Anable et al. (2013) found that car purchase feebates were the most effective policy instrument (relative to excise taxes and scrappage schemes) at achieving GHG emissions reductions quickly in the U.K. and, if carefully implemented, can result in relatively little burden to the consumer.<sup>61</sup> In contrast, Higgins, Paevere et al. (2012) modeled various feebates in Australia and determined that they would have virtually no impact on the fraction of BEVs, PHEVs and ICE vehicles sold by 2030.<sup>62</sup> Using the Swiss fleet, de Haan, Mueller et al. (2009) studied different revenue-neutral feebate schemes which included both a cash incentives for very fuel efficient vehicles and additional fees for the most fuel inefficient vehicles.<sup>63</sup> They concluded that these feebate systems nudged consumers to pay for the more efficient version of the vehicle they wanted anyway, rather than an entirely different vehicle.
  - It appears feebate programs may be effective in some cases, but it is unclear how such an approach would work in California. Bunch et al. (2011) finds that while feebate policies in California may achieve additional GHG reductions than otherwise expected from emission standards alone, factors beyond the State's control would really determine the effectiveness of such a policy.<sup>64</sup> This approach would require legislative action.

---

<sup>61</sup>Brand, C., et al. (2013). "Accelerating the transformation to a low carbon passenger transport system: The role of car purchase taxes, feebates, road taxes and scrappage incentives in the UK." *Transportation Research Part A: Policy and Practice* 49(0): 132-148.

<sup>62</sup>Higgins, A., et al. (2012). "Combining choice modelling and multi-criteria analysis for technology diffusion: an application to the uptake of electric vehicles." *Technological Forecasting and Social Change* 79: 1399-1412.

<sup>63</sup>de Haan, P., et al. (2009). "How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars—Part II: Forecasting effects of feebates based on energy-efficiency." *Energy Policy* 37(3): 1083-1094.

<sup>64</sup>Bunch, D. S., et al. (2011). "Potential Design, Implementation, and Benefits of a Feebate Program for New Passenger Vehicles in California"

- Emissions-Based Incentives
  - Emissions-based taxes may encompass both taxes on the vehicle, such as registration fees, and taxes on the fuel, such as gasoline taxes. Eppstein, Grover et al. (2011) simulated consumer uptake of PHEVs and concluded that gas prices and the ability of consumers to accurately account for lifetime fuel costs for PHEVs vs. ICEs or HEVs play an important role in determining PHEV uptake. They recommend setting a price floor or otherwise taxing gasoline in order to foster continued growth of PHEV market share.<sup>65</sup> Morrow, Gallagher et al. (2010) concluded that increasing the cost of driving through gasoline taxes resulted in the largest GHG reductions compared to tax credits for new vehicles and increasing fuel economy.<sup>66</sup> Brand, Anable et al. (2013) concluded that vehicle excise taxes can be effective at reducing GHG emissions, but acknowledged that they are more likely (relative to feebates and scrappage schemes) to face opposition from the driving public and lobbying groups.<sup>67</sup> Ozaki and Sevastyanova (2011) examined the motivations for British consumers of HEVs (Toyota Prius) and found that, among many factors that influence their decision, London's congestion charge may be a significant influence.<sup>68</sup> To varying degrees, many researchers all found that gasoline prices and their volatility are important motivators for the adoption of cleaner vehicles.<sup>69,70,71,72</sup>
- Targeting Niche Markets
  - Some argue that incentives would be more cost-effective if targeted specifically to niche markets, such as car sharing and fleets in addition to early adopters instead of mainstream consumers.<sup>73</sup> A co-benefit of PEV car sharing programs is that they allow a larger number of drivers to experience an electric vehicle, making drivers more comfortable with and interested in PEVs as well as re-evaluate their preferences of different vehicle

<sup>65</sup>Eppstein, M. J., et al. (2011)ibid.

<sup>66</sup>Morrow, R. W., et al. (2010). "Analysis of policies to reduce oil consumption and greenhouse-gas emissions from the US transportation sector." *Energy Policy* 38(3): 1305-1320.

<sup>67</sup>Brand, C., et al. (2013). "Accelerating the transformation to a low carbon passenger transport system: The role of car purchase taxes, feebates, road taxes and scrappage incentives in the UK." *Transportation Research Part A: Policy and Practice* 49(0): 132-148.

<sup>68</sup>Ozaki, R. and K. Sevastyanova (2011). "Going hybrid: An analysis of consumer purchase motivations." *Energy Policy* 39(5): 2217-2227.

<sup>69</sup>Diamond, D. (2009). "The impact of government incentives for hybrid-electric vehicles: Evidence from US states." *Energy Policy* 37(3): 972-983.

<sup>70</sup>Beresteanu, A. and S. Li (2011). "Gasoline prices, government support, and the demand for hybrid vehicles in the United States." *International Economic Review* 52(1): 161-182.

<sup>71</sup>Gallagher, K. S. and E. Muehlegger (2011). "Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology." *Journal of Environmental Economics and Management* 61(1): 1-15.

<sup>72</sup>Hidrue, M. K., et al. (2011). "Willingness to pay for electric vehicles and their attributes." *Resource and Energy Economics* 33(3): 686-705.

<sup>73</sup>Green, E. H., et al. (2014). *ibid.*



attributes.<sup>74,75</sup> Fleets tend to be early adopters because they have high vehicle purchase rates. A survey of fleet managers in the U.S. and the Netherlands determined that their main motivation for their initial PEV adoption was testing new technologies.<sup>76</sup> However, for financial reasons, half of the fleets decided not to expand their PEV fleets beyond their initial test purchase even with government subsidies. In contrast, a modeling study based on the current travel patterns of their gasoline vehicles determined that it is profitable for a San Francisco taxi company to transition their fleet to PEVs in San Francisco.<sup>77</sup> The researchers suggest this may be true for other taxi companies in other cities with similar mobility practices because of the higher cost of electricity in San Francisco compared to the rest of the U.S. Green, Skerlos et al. (2014) proposed replacing the U.S. Postal fleet with PEVs, as the majority of the delivery routes are less than 24 miles and their current fleet is nearing the end of their useful life.<sup>78</sup>

- Staff agrees that targeting incentives specifically to niche markets such as car sharing, public fleets, and providing financing tools to early adopters is an important component for successful ZEV adoption. ARB has already begun investments in these areas and recommends ramping them up over time as outlined in the three-year funding forecast.
- Choose Your Incentive
  - Stakeholders agree that different incentives motivate consumers differently in various regions. Therefore limiting consumers with only one state incentive, for instance to choose between financial rebate or HOV sticker, may take the pressure off the growing market by splitting the burden between direct and indirect incentive mechanisms. At this time, staff does not have a clear proposal for how to structure such an approach. However, staff will continue to evaluate this option for consideration in future funding cycles.

Although not the primary concern of an effective incentive program, incentive types that are easy to evaluate provide policymakers with more straightforward opportunities to adjust and improve the program. It is also much more straightforward to evaluate the effect of an incentive program if it is offered in isolation, as demonstrated by Chandra, Gulati et al. (2010) for Canada's HEV rebate program.<sup>79</sup> The presence of other

---

<sup>74</sup>Jensen, A. F., et al. (2013). "On the stability of preferences and attitudes before and after experiencing an electric vehicle." *Transportation Research Part D: Transport and Environment* 25: 24-32.

<sup>75</sup>Shaheen, S., et al. (2015). Zero- and low-emission vehicles in U.S. carsharing fleets impacts of exposure on member perceptions, *Transportation Sustainability Research Center*, UC Berkeley.

<sup>76</sup>Sierchula, W., et al. (2014). "The influence of financial incentives and other socio-economic factors on electric vehicle adoption." *Energy Policy* 68(0): 183-194.

<sup>77</sup>Carpenter, T., et al. (2014). "The return on investment for taxi companies transitioning to electric vehicles." *Transportation* 41(4): 785-818.

<sup>78</sup>Green, E. H., et al. (2014). *ibid.*

<sup>79</sup>Chandra, A., et al. (2010). "Green drivers or free riders? An analysis of tax rebates for hybrid vehicles." *Journal of Environmental Economics and Management* 60(2): 78-93.

incentives and perks that influence PEV purchases (such as HOV access, parking and/or charging access, etc.) can confound analysis of the effectiveness of rebates and other financial incentives programs.

ARB staff will consider each of these potential approaches in future funding cycles as it re-evaluates the best strategy for incentivizing advanced technology light-duty vehicles. As staff has noted above, ARB does not have existing statutory authority to implement many of these approaches, so legislative action would be needed in those cases before ARB could consider implementing them.

## **Long-Term Plan Conclusions**

In order to achieve the goals identified by SB 1275 and the Governor's Executive Order to place 1.5 million ZEVs in California by 2025, continued significant investments are necessary, at least in the near-term. As the market share of ZEV grows, with a related increase in demand for rebates, ARB is continuing to refine its strategy to most effectively deploy incentives to foster the growth of the clean vehicle market.

Because the market is still in its infancy, staff recommends using the most reliable and available data to evaluate the market based on ZEV sales in comparison to the comparable California new car market. Using this approach, staff believes that the ZEV market won't be sustainable without broad purchase incentives for at least the next five to ten years. Focused financial incentives, or other types of incentives may still be necessary beyond that point. Staff recommends an approach for ramping down the current incentive over time based both on expected market sustainability and budgetary constraints, and suggests maintaining the primary current incentive structure at least for the next several years.